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Annual Report

OF THE

SECRETARY FOR AGRICULTURE,

NOVA SCOTIA

FOR THE YEAR 1915

(*Printed by Order of the Legislature.*)

MAY 31 1932

HALIFAX, N. S.
Commissioner of Public Works and Mines
King's Printer.
1916

T. C. ALLEN & CO., PRINTERS, HAI

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AGRICULTURE

REPORT OF THE SECRETARY FOR AGRICULTURE FOR THE YEAR 1915.

The Honorable George H. Murray,

Provincial Secretary.

Sir:—In accordance with the requirements of the Act for the encouragement of Agriculture, I have the honor to submit my Annual Report for the year 1914, which contains a statement of the work done during the year under the provisions of the Act and by authority of His Honor, the Lieutenant Governor-in-Council.

This report embraces the following documents:—

Part I.—My Annual Report as Secretary for Agriculture for Nova Scotia. P. 1.

My Report as Principal of the Agricultural College, Truro, being the ninth Annual Report of the Nova Scotia Agricultural College and Farm. P. 20.

Report of the Professor of Botany. P. 26.

Report of the Provincial Entomologist and the Professor of Zoology. P. 28.

Report of the Professor of Horticulture. P. 54.

Report of the Farm Superintendent and Professor of Agriculture. P. 62.

Report of the Superintendent of the Poultry Department. P. 83.

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Report of the Superintendent of Women's Institutes. P. 116.

Part II.—Report of Agricultural Societies, Associations, Exhibitions, Meetings and Field Crop Competitions. Pp. 1 to 137.

Part III.—Series of articles on Soils, Pp. 1 to 206.

I have the honor to be, Sir,

Your obedient servant,

M. CUMMING,

Truro, Feb. 1st, 1916. *Secretary for Agriculture.*

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Note.—Practically all matter contained in this report is written from the standpoint of prices and practices prevailing at normal times. This is for the reason that the value of the report will, it is hoped, far outlive the duration of the war.

Errata.

Page 117. Par. 19 should read:

19. Are there any duties on fertilizers?

Ans. All fertilizers whether dutiable or not are exempt from the special extra war tax.

Compounded or manufactured fertilizers are levied a duty of 10% general and 5% preferential. Basic Slag pays the same duty.

Acid Phosphate is levied 20% general and 12½% preferential.

Other fertilizers unmanufactured, including phosphate rock, kainite or German potash salts and German mineral potash; bone dust, charred bone and bone ash, fish offal or refuse and animal and vegetable manures; nitrate of soda and sulphate of ammonia are all duty free.

A General View of Grounds and Buildings.

Main Building.

NOVA SCOTIA COLLEGE OF AGRICULTURE.

PART I.

AGRICULTURE.

REVIEW OF THE WORK OF THE AGRICULTURAL DEPARTMENT OF THE GOVERNMENT OF NOVA SCOTIA.

The Honorable George H. Murray,
Provincial Secretary,
Halifax, N.S.

Sir:—

Although the war has now been waged for nearly one and one half years it has not produced any appreciable effect on Nova Scotian agriculture. True, owing to enlistment, a little pinch in available farm labor is now beginning to be felt, and for a similar reason the attendance at the College of Agriculture is being reduced. True, high ocean freights have cut down the net returns from apples and prices for fertilizers and a few other perquisites of the farmer are higher. But on the other hand there has been an unlimited market for practically all the produce of the farm; prices in the home market have ruled high; and in general, were it not for the accounts in the newspapers the average farmer would hardly realize that the conflict was being carried on. However, if the war continues, more trying conditions are bound to develop, especially in reference to available labor and the prices of suchnecessary materials as fertilizers. The slogan of 1915 was "Patriotism and Production." The slogan of 1916 will have to be "More Patriotism and Greater Production." But it will take more effort on the part of the individual farmer to live up to the slogan of 1916 than it did in 1915. Nevertheless there are many hopeful movements now getting under way in Nova Scotia that will help, and it is our main purpose in this report to sum these up with a view to inspiring greater effort in 1916.

The report includes three parts as follows:

Part 1.—The General Report of the Secretary for Agriculture, including a resume of all the reports presented in the subsequent pages and also a brief description of the character of the season, the crops, live stock, etc. Following this, are the reports of the various officers of the Department and College of Agriculture, in regard to whom I may explain that the majority hold dual positions as instructors in the College and as heads of divisions in the Department. Their reports cover both lines of work.

Part 2.—Report of the Superintendent of Agricultural Societies and Associations and Exhibitions, treating in detail of (a) Agricultural Societies, (b) County Farmers' Associations, (c) County Exhibitions, (d) Field Crop Competitions and Demonstration Work.

Part 3.—A series of educational articles on "Soils, Soil Cultivation and Crops in Nova Scotia," Edited by M. Cumming. This series is a continuation of the series of articles on topical subjects which was commenced in the year 1907.

THE SEASON OF 1915.

Frequent rains; freedom from frost; the heaviest hay crop and the best pastures for years; grain about 20 per cent. below normal, and turnips and other roots likewise; potatoes a little more than half a crop; apples about 66 per cent. of last year, and about one-third of the 1911 crop, and even that more than usually affected with black spot. Such has been the season of 1915 for the farmer of Nova Scotia.

In the realm of the general farmer the dairy cow has been queen, producing about 10 per cent. more than last year. Moreover, the general farmer has been encouraged by the much higher prices prevailing for potatoes and the somewhat higher prices prevailing for hay and other products of the farm. The fruit farmer, with his smaller crop of apples, grading lower in quality than usual, is in part compensated by prices somewhat better than last year, and here and there is a grower, who having thoroughly sprayed his trees, has realized the biggest returns in the history of his orchard. Strawberries yielded splendidly, and in the comparatively small area where cranberries are cultivated, record crops, for which good prices are being received, were gathered.

Although most correspondents refer to the spring of 1915 as a late one, the fact remains that on properly drained land it was possible to sow seed earlier than for a number of years; for example, on the College Farm the first wheat was sown on April 22nd, and the first oats on April 29th, in comparison with April 26th the first day of seeding in 1914, and May 13th the first day of seeding in 1914. The earliness of the season is further indicated by the fact that haying began nearly a fortnight earlier than in 1914, as is shown by records from the College farm on which haying in 1915 began on July 13th in comparison with July 27th in 1914.

Although the season opened early giving an opportunity for early seeding on well tilled land, yet the month of May was comparatively wet, so that those who did not get on the land when it was ready in April had to defer a large part of their seeding until the month of June. This in part explains the widely variant reports which have been received from different farmers with regard to the final returns from the various crops.

The season was unusually free from frost, the last frost in Truro in the spring being on June 3rd, and the first fall frost being on September 26th.

The following table contains actual figures of the rain fall for the year. In pursuing it, one notices the much heavier precipitation during the months of May, August and October, which sufficiently explains the delayed seeding referred to in the foregoing, the difficulty in curing hay in August and the retarding of fall plowing and other farm operations in October. The fortunate factors in the rain fall were that the continuous rains of May and June favoured the heaviest hay crop in years, and the light rain fall of September afforded good conditions for harvesting oats and other cereals. Unusually heavy rains about July 9th and August 29th did serious damage to growing and standing crops, and on September 27th a gale, claimed by some to have been the heaviest since the Saxby gale of 1873, blew off thousands of dollars worth of apples and did other damage as well.

It will no doubt surprise the reader to learn that, although there was so much precipitation throughout the whole season in the Province generally, yet in the County of Yarmouth from the 1st of July to the end of September there was little precipitation and the farms actually suffered from drought.

In addition to the rain fall for 1915 there appears in the following table a record of maximum and minimum temperatures and of the precipitation for the two previous years.

MONTH		Temperature Maximum	Temperature Minimum	Precipitation 1915	1914	1913
January	1915	57.0	—11.5	3.71	3.50	2.96
February	"	54.0	—14.0	2.62	1.75	2.58
March	"	49.0	5.0	1.45	1.91	4.70
April	"	65.0	17.0	2.19	2.10	5.93
May	"	72.0	27.0	3.79	1.08	2.69
June	"	80.0	28.0	2.92	3.45	1.49
July	"	83.0	44.0	2.55	2.52	2.36
August	"	79.5	38.0	5.64	2.66	2.34
September	"	78.0	28.0	1.65	2.49	3.11
October	"	73.0	26.0	5.15	2.68	9.21
November	"	57.0	20.0	3.65	3.40	2.98
December	"	54.0	6.0	4.29	4.38	4.86
				39.61	31.92	45.21

The value of these field and orchard crops calculated from the prevailing market prices is $24,347,658. In addition to the foregoing should be included at least 50% of the returns from such live stock products as milk, butter, wool, lambs, etc., a large proportion of which are produced on pastures of which no reckoning has been made in the above table. Moreover, there should be included an estimate of the profit made from feeding purchased and home grown feeds to live stock. The additional income estimated on these scores (50% of the total returns) is $8,000,000. This brings the total returns from the agricultural industry in the Province of Nova Scotia for the year 1915 up to $32,347,658.

CONDITION AND NUMBERS OF LIVE STOCK.

The excellent pastures of the year are responsible for live stock being in an extra good condition. Not for years have cows produced so much milk or produced it so cheaply. The average of the estimates made by 315 correspondents indicates a 5% increase in the numbers of dairy cattle, 1% increase in beef cattle, 4% increase in horses, 4% increase in sheep, 4% increase in hogs and 5% increase in poultry. While these figures are not absolutely reliable, yet they indicate that some advancement at least is being made. Unquestionably the greatest improvement has been in the dairy cow. She has produced at least 10% more milk than during the previous year. In a subsequent paragraph on dairying, the figures presented will, we think, inspire one to believe that in years to come the returns of the dairy cow will become still more marked.

NUMBERS OF LIVE STOCK IN NOVA SCOTIA.

Horses	70,395
Milch Cows	145,460
Other Cattle	162,993
Sheep	226,406
Swine	60,119
Poultry	1,136,763

COLLEGE OF AGRICULTURE AND FARM.

It was to be expected that the large enlistment would materially affect the College of Agriculture and it has. In general the attendance during 1915-16 in the regular course is about 40% less than before the war broke out and in the Short Course about 20% less. The actual figures will be found in the subsequent report of the Principal. While, however, the attendance is less, I think that anyone familiar with the agricultural development of recent years must recognize the growing influence of the institution. By all odds the best live stock on the College Farm are the dairy cattle; the foremost position in instruction is given to dairying; and wherever they have gone, the staff of the College have urged more and better dairying in the Province, and all these influences are having a telling effect. I might refer in the same way to other lines of development to which the College staff are bending their efforts.

I would strongly urge everyone interested in agriculture to read the detailed reports of the various members of the College staff. They will find these reports replete with valuable information. These reports will be found in the subsequent pages beginning with the Principal's Report and continuing with the reports of the various members of the staff.

THE NOVA SCOTIA FARMERS' ASSOCIATION.

The 1915 meeting of the N. S. Farmers' Association was held in Antigonish. The 1916 meeting will be held in Windsor. This Association is regarded as the Farmers' Parliament for the Province and it has in the past been responsible, by its recommendations, for many of the best features to the present agricultural policy. A separate report is annually issued. It may be procured on application to C. R. B. Bryan, Secy. N. S. Farmers' Association, Truro, N. S.

COUNTY FARMERS' ASSOCIATIONS.

In the constitution N. S. Farmers' Association provision is made for the organization of sub-associations in each county. In 12 out of 18 counties of the Province these County Associations are now organized. Some are doing an excellent work along educational lines as well as in conducting Exhibitions, Seed Fairs, etc. In a few counties the Associations have purchased co-operatively improved seed and sometimes other agricultural material. In other counties the associations have very little definite work to do, mainly for the reason that other bodies have absorbed the various lines of activity referred to. The idea was presented at the last meeting of the N. S. Farmers' Association that the County Associations might be organized into co-operative bodies to purchase and sell farm products and in the Legislature in 1916 legislation was passed to make this possible. The question will be further discussed at the next annual meeting of the N. S. Farmers' Association. For a report of these associations see part 2 of this publication.

THE NOVA SCOTIA FRUIT GROWERS' ASSOCIATION.

This Association occupies the same position in relation to fruit growing that the Farmers' Association does to general farming. The 1915 meeting was held at Middleton and the 1916 meeting will be held at Wolfville. The reports of the Association which are published under the direction of the Secretary, always contain the most up to date horticultural information that is available. For copies apply to M. K. Ells, Secy., Port Williams, Kings Co., N. S.

THE DAIRYMENS' ASSOCIATION OF NOVA SCOTIA.

This body is becoming one of the most aggressive organized bodies having to do with agricultural interests in the Province. It has been only three years in existence, during each of which years a Convention has been held at the College of Agriculture, Truro. The members of this body are composed of the managements of the creameries and cheese factories and the butter and cheese makers of the Province. The progress which has been made by these companies during the past few years is prophetic of a tremendous development in years to come. Read the report of W. A. MacKay, who is Secretary of this body and also Dairy Superintendent of the Province.

NOVA SCOTIA POULTRY ASSOCIATION.

This Association was organized in 1911 and consists of representatives from the County Poultry Clubs which are gradually being organized throughout the Province. An Annual Convention is held each year at which matters pertaining to the poultry industry of the Province are discussed and at which recommendations are made relative to the future poultry policy of the Government. The Secretary is J. P. Landry, Poultry Superintendent for Nova Scotia, Truro.

NOVA SCOTIA ENTOMOLOGICAL SOCIETY.

This Society was organized during the current year. A Convention was held in Truro in August and a separate report, which contains a large amount of valuable entomological information is now being published. The Secretary is W. H. Brittain, Provincial Entomologist, Truro.

AGRICULTURAL SOCIETIES.

The number of Agricultural Societies in the Province has been increased by twenty during the current year. The total number eligible for the Government Grant this year is 247, in comparison with 160 in the year 1907. The increase over last year is 20 societies, 451 members and $2000.-00 subscribed.

The majority of these societies devote practically their whole attention to live stock improvement and have agreed to confine their efforts to one or at the most two distinctive breeds (beef and dairy) in each community. Even those, that have made a change in their selection of breeds for the current year, have determined to stick to the breed of their choice for at least a period of years. A full report of these societies will be found in part 2 of this publication being the report of F. L. Fuller, Superintendent of Agricultural Societies.

THE UNITED FRUIT COMPANIES.

This body does not receive a Government Grant and does not make any report to this Department. Nevertheless, representing as it does from thirty to forty smaller co-operative companies, it is one of the most important organizations in the Province. The Company sells apples and other farm produce and purchases fertilizer, feeds and many other commodities. Its operations have attracted attention in many parts of the world. The Manager is A. E. McMahon, Berwick, N. S., and the Secretary, A. E. Adams, Berwick, N. S.

WOMEN'S INSTITUTES.

It was as late as July 1913 that the first Women's Institute was organized in Nova Scotia. The number has now increased to 44. The Superintendent is Miss Jennie A. Fraser, of New Glasgow, whose report will be found in a subsequent part of this publication.

Apart from various lines of community work, these Institutes have contributed for patriotic purposes $8,662.99; have forwarded 162 boxes of clothing, etc; and 23 of the societies united to contribute a $1540 motor ambulance to the Provincial Red Cross Association. The Convention of 1916 was held in the new Science Building, one whole flat of which 120 by 50 feet has been set aside for domestic science work and Women's Conventions. No other organization has done so much to bring together women of all denominations and creeds to work for the common benefit of the communities in which they reside as well as of the country at large.

EXHIBITIONS.

The Provincial Exhibition held at Halifax in September last, although held under the war cloud, was one of the most successful ever held. The same observation is also applicable to the Maritime Winter Fair held in Amherst in December and the Maritime Horse Show also held at Amherst in April.

With two exceptions the 12 County Exhibitions of the year have recorded a larger attendance, a larger number of exhibits, more prize money paid out and in general the most successful exhibitions held.

Further six Seed Fairs were held namely at Yarmouth, Bridgewater, Musquodoboit, Truro (The Provincial Seed Fair) Antigonish and Port Hood, all of which were most successful and all of which are yielding splendid results, which are manifested in the greater interest in growing and purchasing and sowing improved seeds of all kinds. In addition to these, some five County Poultry Club Shows were held, reports of which will be found in the report of the Poultry Superintendent. The reports of the County Exhibitions will be found in part 2 of this report.

MEETINGS.

The old procedure of simply holding a meeting for the sake of a meeting has largely passed by. Whenever, in any part of the country, a special effort is being made to establish a creamery to encourage the growing of some particular crop, to organize an Agricultural Society, or to establish some similar specific work in a community, then the Department of Agriculture is always ready to accede to requests for a speaker. Nevertheless, there are times when a sort of revival meeting at which the gospel of improved agriculture is preached is well worth while. Meetings of both sorts were held during the year but the former greatly exceeded the latter. In all, the number of official meetings was approximately 250, with an average attendance of about 45. In addition there were many local meetings of which no records have been preserved.

FIELD CROPS COMPETITIONS.

Each year sees an increasing interest in the Field Crops Competitions. Last year there were 326 entries. This year the number increased to 385. Nevertheless in the western part of the Province some decreases are reported. The greatest progress has been in the East and especially in the Cape Breton Counties and Antigonish. Field Crop Competitions are held to encourage the better growing of oats, wheat, potatoes and turnips. As a result of these competitions, farmers who formerly purchased their own seed supplies, often of an indifferent quality, now grow their own and the quality is very much better. Even when they buy, they now make an effort to buy first class seed and if possible that which has been grown under climatic conditions similar to their own.

The prize money for these competitions in oats, wheat and potatoes is paid about equally by the Federal and and Provincial Departments of Agriculture and it is worth noting that the co-operation of these Departments in these lines of work has proven of tremendous value especially in so far as it has removed the slightest suggestion of any political motive. I must again make special reference to the assistance which has been rendered the Provincial Department by S. J. Moore of the Seed Division of the Dominion Department of Agriculture, who although an officer of the Federal Government, has done everything in his power to promote the local work.

The Boys Turnip Growing Competitions inaugurated some four years ago through the generosity of an ex-Nova Scotian, now living in New York, in the Counties of Cumberland and Colchester, has now been extended through the generosity of E. M. MacDonald, M. P., R. M. MacGregor, M. P. P., and R. H. MacKay, M. P. P., in Pictou County, through D. G. Kirk, of Antigonish County and through the members of the Halifax Board of Trade, in Halifax County; and while local men have taken up the burden in Colchester County, the originator of the contests has transferred his aid to Inverness and Guysboro Counties. The whole story of these Field Crops Competitions will be found in part 2 of this report and it should be read by everyone.

MODEL ORCHARDS.

There are now 35 Model Orchards which have been established in the non-fruit growing counties of the Province. Anyone interested in the best varieties to set out and the method of culture to pursue in these counties should read the report of the Horticulturist which appears in a subsequent page in which will be found a discussion of the results of the model orchard work.

UNDER DRAINAGE.

Owing to Mr. B. H. Landels, who had charge of this work, having enlisted for overseas service, the operations of the Department were largely curtailed. However, Mr. A. E. Humphrey, his efficient assistant, conducted thirty-one farm surveys, making detailed drainage plans in each case, and in addition visited many other farms giving advice in regard to drainage problems.

The traction ditcher, owned by the Government, was not operated during the season, but the concrete tile making machine was operated at Lyon's Brook, Pictou County where 31,000 tile of all sizes from 3 to 8 inches were manufactured. Under the policy of the Department, this machine with a competent man in charge will be sent to any farmer or group of farmers who purpose manufacturing 20,000 or more tile. Details of the nature of the agreement may be secured on application to the Drainage Division, Department of Agriculture, Truro.

DAIRYING.

A continued increase in the amount of butter manufactured in Nova Scotia creameries is again reported. The actual increase for 1915 over the previous year is 34% and the increase since 1910 is nearly 500%. Practically all the old creameries have increased their output. Two new creameries commenced operations during the year and the Government erected the second of its demonstration creameries, this second one being in Margaree, C. B. Not only in the creameries but in the private dairies, butter making has progressed, it being estimated that 10% more butter was made in Nova Scotia this year than during the previous year. The report of W. A. MacKay, Dairy Superintendent which will be found in the subsequent pages of this report, is well worth the reading.

HORSE IMPROVEMENT LEGISLATION.

There were enrolled under the Stallion Enrolment Legislation of 1912-13, 255 stallions, of which 94 were pure breds, 79 grades and 82 Cross Breds. The number inspected to date for soundness, which inspection is optional, is 55. As a matter of general interest the following figures in regard to breeds are presented. There were 39 Standardbreds, 37 Clydesdales, 8 Percherons, 5 Hackneys, 2 Thoroughbreds, 1 French Coach, 1 French Canadian and 1 German Coach. In some parts of the Province, the law has not received the support which we thought would be given to it by progressive horse men. Albeit there are quite a number of instances where the law has already proven the means of purchasers securing stallions qualified for enrolment in Class 1. Continued support of the law will undoubtedly bring about a big improvement in the quality of horse flesh produced in the Province.

INSECT PESTS AND FUNGUS DISEASES.

The report of W. H. Brittain, Provincial Entomologist, who in addition to his regular duties has during the past year taken charge of work in connection with the fungus diseases of potatoes, apples, etc. the diseases of bees, etc., is a most comprehensive one. In this report it appears that although a most thorough search was made yet 6002 less Browntail moth nests were taken than during the previous year and only six trees affected with San Jose scale were discovered in comparison with 723 in 1912. It is evident therefore that these dangerous pests have been kept well in hand. Just how much the Province owes to the Department of Agriculture for its aggressive work along this line will never be known. At the same time any one, who has visited parts of the world where these pests have become established, must realize that Nova Scotians have been saved thousands upon thousands of dollars of loss because of the prompt and efficient work of the Provincial Entomologist and his assistants. This inspection has been rendered doubly efficient by the co-operation of the officials of the Federal Department of Agriculture with those of the Provincial Department.

That part of Mr. Brittain's report that deals with potato inspection is of special interest to those who are engaged in the export potato business.

The new feature of the year along this line is the investigation of the apiaries of the province which was carried on last summer. A full statement of this is to be found in Mr. Brittain's report. Special attention is directed to his recommendation that a Foul Brood Act and an appropriation for administering the same should be passed at the ensuing session of the Legislature.

ENCOURAGEMENT OF WHEAT GROWING IN NOVA SCOTIA.

It is always hard to forecast what will happen in war times. Last season the outlook was for high priced flour and a scarcity of wheat and cereal products of all kinds. Hence, many of the best farmers in the Province felt that an effort should be made to encourage the more extensive growing of these staple sources of food supply. The most urgent demand along this line came from the fruit counties where it was felt that farmers could profitably grow more wheat and other cereals in addition to their apples and from the Island of Cape Breton, where the farmers did not have access to a modern cereal mill. It was therefore decided, largely in the way of an experiment, to bonus a cereal mill at Berwick in Kings County and to erect a mill at some point on the shores of the Bras d'Or Lakes, which would be accessible to a large part of the Island, and Baddeck was the point selected. The details of the erection of this mill at Baddeck and the inspection of the mill at Berwick were placed in the hands of W. A. MacKay, Dairy Superintendent who, prior to taking up his work in Nova Scotia, was engaged in the work of milling in the Province of Ontario. His report will be found immediately following his report as Dairy Superintendent. Personally, I may say that I am particularly glad that such a complete mill has been erected at Baddeck for I hope that it will prove the means of materially stimulating the production of wheat and oats in this eastern part of Nova Scotia and in so far as it will bring this about, I regard the establishment of this mill as a matter of educational as well as material importance. Just, as was the case with the dairy industry, our teaching did not accomplish much until the means of marketing was placed within access of the farmers, so it seemed in regard to the corresponding phase of cereal production in this part of Nova Scotia. We will watch with unusual interest the result that will follow the establishment of these two mills and if the experiment proves a success, will be ready to entertain similar propositions in these and other parts of the Province. There is a grave danger however, of too many mills being erected for unless a mill has a large patronage, it is difficult to make it pay.

Great difficulty was experienced in obtaining seed wheat last spring, and for such as was available unusually high prices were asked. It was therefore decided to lend some assistance to the farmers in obtaining seed wheat. A supply was secured to be sold to farmers, who made application, at the wholesale price, the Department paying practically all the freight. To be exact, the cost of the wheat, bags included, to the Department was $1.97 per bushel. It was sold at $2.00 per bushel, delivered at any point in Nova Scotia. The average freight was in the vicinity of twenty cents per bushel. In all 967 bushels were shipped. The unfortunate feature was that owing to the heavy rains of the season, conditions for wheat growing were not satisfactory and the crop was therefore not as heavy nor of as good quality as could be grown in most years in the Province.

FEDERAL APPROPRIATION TO THE PROVINCE UNDER THE AGRICULTURAL INSTRUCTION ACT, 1915-16.

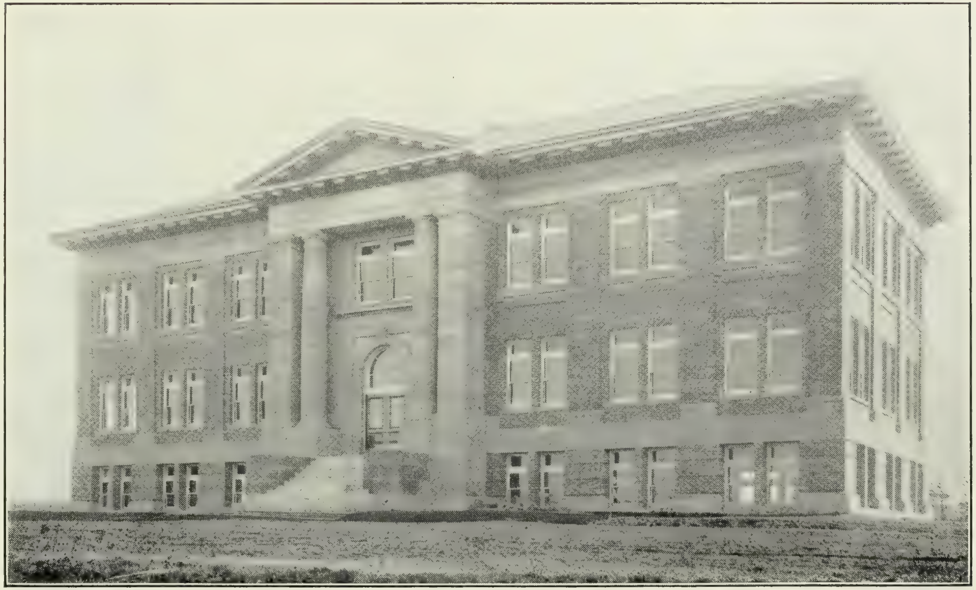
The Department of Agriculture of the Government of Nova Scotia received from the Dominion Government for purposes of Agricultural education during 1915, the sum of $68,001.87. In the following table will be found a statement of the agreement made between the Nova Scotia Department of Agriculture and Dominion Department of Agriculture in regard to the purposes for which this money was to be spent.

Agricultural Colleges and Agricultural Schools:—

(a) Capital expenditure to pay interest and sinking fund on cost of construction of and furnishing for science building....	$7,500	
(b) Salaries and maintenance..........	20,000	
		$27,500.00

Instructors, Directors, Superintendents and District Representatives. Salaries and expenses		7,000.00
Instruction and Demonstration:—		
Dairying	3,500	
Poultry	1,600	
Bee-keeping	400	
Soils (including drainage and field crops)	2,300	
Horticultural and Entomologist investigation	7,500	
Fruit Growing	1,200	
Short Courses	3,000	
		$19,500.00
Women's Work (Women's Institutes, Home Makers' Clubs, Domestic Science, etc.)		3,000.00
Bulletins, reports, circulars and miscellaneous printing		500.00
Instruction in Public and High Schools and in Normal Schools in Agriculture, Nature Study, training of teachers and school gardens		10,000.00
Contingencies and miscellaneous		501.87
Total		$68,001.87

Anyone who compares recent reports of the Secretary for Agriculture with the prior issued ones, must observe thematrked growth of the work. This is in part due to the naural growth in the character and scope of the operations of any progressive Department. Nevertheless this increased work could not have been prosecuted to the same extent as it now is without a large increase in appropriations. The Local Government has in the past decade nearly doubled its appropriation to agriculture but even this increased appropriation would have been insufficient to provide for the enlarged activities of the Department. We are, therefore, bound to acknowledge again the indebtedness of the Province of Nova Scotia to the Federal Government for its appropriation under the Agricultural Instruction Act, a statement of the agreement in regard to the expenditure of which is presented in the above table. Personally, I must again state that it has been a genuine



Science Building, College of Agriculture, Truro.
Formally opened January 11, 1916 by C. C. James, L. L. D., C. M. G., Agricultural Commissioner, Dominion of Canada.

pleasure to carry out the provisions of the Agricultural Instruction Act with a view to further upbuilding the agriculture of the Province.

The following is a brief detail of the expenditure under each head:

Capital Expenditure.

A Science Building providing facilities for instruction and investigation work in Chemistry, Entomology, Plant Pathology, and Domestic Science has for years been sorely needed at the College of Agriculture. We have been particularly hampered in carrying on investigations work in soils, plant disease and insects. The new Science Building, which was briefly described in the report of 1914, has now been completed and is admirably suited for all these purposes. The information already given farmers as a result of analyses carried on in the new laboratories is with respect to the lime requirements of their soils has proven of great value. The investigation work conducted by the Entomological Department is also being highly commended especially by the fruit growers of the Province. It is needless to state that the equipment provided for women's work has received the most hearty endorsement and approval of the women who have been at the College during the present term.

Salaries and Maintenance, Agricultural College.

In addition to their duties as instructors in the regular classes at the College, the members of the College of Agriculture staff devote a large share of their time to what may be termed extension work in the Province. For this reason it is doubly important that the funds provided for College Maintenance be ample to make possible the securing and holding of the services of the very best men who can be procured. The Federal Appropriation has proven invaluable in this regard. It has moreover made possible the better equipment of the laboratories in which instruction and investigation work is carried on.

Instructors, Directors, Superintendents and District Representatives.

Lack of funds has prevented the complete adoption of the County Representative system in Nova Scotia. However, certain counties, where it is felt that particularly valuable work could be done, have been selected and the appropriation under the above head has been used to pay the salaries and expenses either for the whole year or for a certain number of months of men whose work is largely equivalent to that which is being done by County Representatives elsewhere. In Antigonish County a permanent representative has been appointed. In the Cape Breton counties four men (three graduates of the Agricultural College) have been employed to give special attention to crop growing demonstrations. Mr. H. S. Cunningham, who has for several years been the Director of this work, was provided with an automobile. In Richmond County special arrangements were made with Father Robitaille, of Arichat, to carry on demonstration work, especially in the fishing sections where French is the principal language spoken. In addition to the work done in these counties, specific lines of work have been conducted in other counties of the Province. This year a clover huller was purchased, the first ever used in Nova Scotia and now when farmers are confronted with the highest prices they have probably ever had to pay for clover seed it is satisfactory to learn that the farmers in one comparatively small section of the country have threshed with this machine a ton of clover seed. It is hoped that this year's experience may lead to the growing of a great deal more clover seed in future years. Incidentally the most valuable point learned to date is that first growth clover seems to have given the most satisfactory seed return.

Instruction and Demonstration.

Dairying.—That portion of this appropriation which was used for dairying has provided half the salary and the expenses of W. A. MacKay, Dairy Superintendent. It has also been used to pay all the salary and expenses of his assistant. No other money spent by the Department of Agriculture had yielded bigger returns than the combined appropriations of the Local Government and the Federal Grant for Dairying.

Poultry.—This appropriation has been largely used to pay for the construction of demonstration poultry houses in various parts of the Province, for the supplying of settings of eggs to school children and for the expenses of J. P. Landry, Poultry Superintendent and others in conducting educational meetings throughout the country.

Bee Keeping.—The appropriation for bee keeping was used this year to pay for a survey of this industry in the Province. Mr. Morely Pettitt, Provincial Apiarist for Ontario, devoted some two weeks to this survey under the direction of Mr. Brittain, the Provincial Entomologist. The balance of the survey was made by the regular Entomolo-ical inspectors of the Province. As a result of the survey, some idea of the extent of Foul-Brood infection, one of the most troublesome bee diseases in the Province has been obtained and it is urged that Legislation be passed and pursuant measures taken to suppress this disease.

Soils.—The appropriation for soil investigations has been used to pay the salary of an assistant chemist so as to make possible the continuation of the soils survey which was commenced some two years ago; to pay the expenses of the Assistants in the Drainage Department whose time has been largely devoted to making drainage surveys on the farms of the Province; to pay the expenses of conducting demonstration work in the manufacture of concrete tile; and to pay for seeds, fertilizers and crushed lime stone which were used for co-operative experimental work in the various counties of the Province.

Entomological Investigation.—The appropriation for entomological work has provided funds to pay the salary and expenses of the Assistant Entomologist and half the salary and expenses of the field men. In reporting this work, I always feel that, since the work is of a preventative character, the people of the Province will never realize just how much has been accomplished. In the meantime it is sufficient to point out that the small infestation of San Jose Scale has been almost completely eradicated, that the Brown Tail Moth has been kept within bounds and that investigation work conducted along various lines has already given practical results which have met the approval of the best fruit growers and farmers of the Province.

Fruit-growing.—The appropriation for fruit growing has been devoted for the most part to demonstration work in renovating old orchards in those parts of the Province where fruit growing is not specialized in. The value of this work consists not so much in the improvement affected in the individual orchards experimented with as in the demonstrations which it is hoped will lead to extensive work along these lines throughout all of the districts in which the demonstrations are conducted. It is hoped that by next year definite figures relating to the production from these renovated orchards will be available and it is anticipated that the results will lead to the desired goal.

Short Courses.—The Short Courses appropriation has been used to supplement moneys provided in Antigonish and in Lawrencetown, Annapolis County, for the erection of demonstration buildings suitable for housing Short

Course classes and for various agricultural purposes. Buildings of this kind have now been erected at Yarmouth, Bridgewater, Musquodoboit, Shubenacadie, Antigonish, and Lawrencetown. In some cases the buildings are on the County Exhibition grounds and have been used in connection with the regular exhibition. In all cases they have proven a centre for the dissemination of agricultural information. During the year, five Short Courses, the cost of which was also paid out of this appropriation were conducted in these buildings and that they were appreciated is indicated by an average attendance at all sessions, morning, afternoon and evening of 147 students.

WOMEN'S WORK.

The Federal appropriation has up to the present time provided all the money used for Women's Institutes and Women's Work of all kinds in the Province. That the effort has been worth while will be impressed upon anyone who reads, in a subsequent part of this report, the statement of Miss Jennie A. Fraser, Superintendent of Women's Institutes.

INSTRUCTION IN SCHOOLS.

All the funds used to promote agricultural and nature study etc. in the schools of the Province have come from the Federal appropriation. The following are some of the most important items for the year; the salary and expenses of the Director, L. A. DeWolfe; the salary of the Principal of the Rural Science School, C. L. Moore; the salaries of the instructors in the Rural Science School conducted at Truro in July and August; the travelling expenses of school teachers attending the school; bonuses paid to teachers who have conducted school or home gardens in connections with their schools; the partial payment of prizes at school Exhibitions; the expenses of sending out settings of eggs, seeds, etc. to various schools; and other incidental expenditures all of which have been made to further vocational education especially in the rural schools.

CONTINGENCIES.

Under contingencies the principal items paid have been for accounting and for paying the services of men employed in connection with incidental work along the lines of the appropriation.

CONCLUSION.

Each year, the farming outlook of Nova Scotia seems to improve. Despite some discouragements to the fruit grower and incidental disappointments to the general farmer, the fact remains that 1915 has witnessed permanent progress. This is especially the case in connection with the dairy industry of the Province. We of the Department of Agriculture have endeavored to do our best and, if we may judge from what we have observed and from the reports received, we feel that something worth while has been accomplished. Personally I have now been eleven years in the service of the Department and when I compare the activities of the present time with those of a decade ago, I cannot but feel that the Department is at least justifying its existence. It would not be fair in closing this report if I did not convey to yourself as Premier and your colleagues, the personal appreciation of myself and other members of the staff for the advice which has been given and the support which has been constantly received. That the results already achieved and the bright prospects of the future may prove a full reward for your anxiety and efforts of earlier years is our best wish. On behalf of the staff of the Department of Agriculture.

I have the honor to be, Sir,

Your obedient servant,

M. CUMMING,
Secretary for Agriculture.

ELEVENTH ANNUAL REPORT OF THE COLLEGE OF AGRICULTURE AND THE COLLEGE FARM.

Sir:—

I have the honor to submit the eleventh Annual Report of the College of Agriculture and Farm, being for the year 1915. The report is divided as follows:—

Part 1—Report of the Principal.

Part 2—Report of the Professor of Botany.

Part 3—Report of the Professor of Zoology and Provincial Entomologist.

Part 4—Report of the Professor of Horticulture.

Part 5—Report of the Professor of Agriculture and Farm Superintendent.

Part 6—Report of the Superintendent of Poultry.

Part 7—Report of the Superintendent of Dairying and Lecturer in Dairying.

Part 8—Report of the Professor of Chemistry.

Part 9—Report of the Superintendent of Women's Institutes.

PART I—REPORT OF THE PRINCIPAL.

As stated in previous reports, nearly all the members of the College staff are also Provincial officers and hence this College report includes a statement not only of work done at the College but also of that which was carried on throughout the country.

The Regular Course.

As is the case in other educational institutions the enrolment of students since the war began has been reduced The present enrolment for the term of 1915-16 is 58, which is about 45% below the enrolment before the war broke out. Of this number 32 are from Nova Scotia, 15 from New Brunswick, 8 from Prince Edward Island, 1 from Newfoundland and 1 from Norway and 1 from the United States. There are 26 Seniors and 32 Juniors.

Graduates of 1914-15.

In April 1915, 32 students were awarded the Associate Diploma of the College. They were:—

Harris Congdon, Dartmouth, N. S.
Aaron Crosby, Yarmouth, N. S.
Henry Dunleavy, Dominion, C. B.
L. W. Eldridge, Brocton, Mass.
Albert S. Fuller, Yarmouth, N. S.
* Arthur M. Frier, Shediac, N. B.
D. K. Finlayson, Grand River, C. B.
G. T. Griffiths, Mount Forest, Ont.
* Douglas Holman, St. John, N. B.
A. E. Humphrey, Apohaqui, N. B.
Clarence Holmes, Avonport, N. S.
*J. H. Hoyt, Hampton, N. B.
John Huddart, New Glasgow, N. S.
J. T. Melanson, Comeauville, N. S.
*Donald Machum, St. John, N. B.
J. L. MacAulay, Lower Millstream, N. B.
Fred M. McKenzie, Nerepis Station, N. B.
A. W. McKenzie, Bedford, N. S.
J. M. F. McKenzie, Coxheath, C. B.
Percy G. MacDonald, Upper Dyke Village, N. S.
Errol Notting, Dartmouth, N. S.
George O'Neil, Searsville, N. B.
William Retson, Truro, N. S.
D. C. Schurman, North Bedeque, P. E. I.
Miss Pear Stanford, Dartmouth, N. S.
J. S. Sutton, Nappan, N. S.
J. Roy Sweeney, Melrose, N, B.
Eldon Taylor, Little Schemogue, N. B.
H. L. Trueman, Truro, N. S.
Leslie Wood, Carter's Point, N. B.
*Arthur Weldon, Dartmouth, N. S.

Those, opposite whose names an asterisk* appears, enlisted during the term and received their diplomas *causa honoris*. One other member of the class who was taking general studies, J. W. Landels of Musquodoboit Harbor also enlisted during the term. Several more have enlisted since graduation.

The Premier Murray cup for the best judging of live stock was won by Howard Trueman, Truro, N. S., and the Prince Edward Island Cup for the best judging of seeds was won by William Retson, Truro, N. S. The highest standing of the year was made Leslie Wood, Carter's Point, N. B.

The Short Course.

The continued interest in the Short Course which is held annually during the first two weeks of January is almost marvellous. True, the war has led to a reduction in the numbers but even at that the Truro Short Course continues to be, so far as we are aware, the largest Provincial Short Course held in Canada. The enrolment for January 1915 was 286, of whom 235 attended the men's course and 51 the ladies course. The enrolment for January 1916 was 255, there being 205 men and 50 women. Of this latter number all but seven, who came from the Provinces of New Brunswick and Prince Edward Island, were residents of the Province of Nova Scotia. Beside the regular students there were as usual a large number of casual visitors, who brought the attendance on some days up to nearly 400. This number was further augmented by delegates to the Maritime Stock Breeders' Association, the Dairymen's Association of Nova Scotia, the Nova Scotia Poultry Association and the Women's Institute Convention who are not included in the foregoing numbers. As was the case the previous year when the Town of Truro entertained the students and delegates as their guests, an audience of nearly 1000 people filled the big College Assembly Hall to its limit. On this occasion addresses were delivered by Dr. C. C. James L. L. D., C. M. G., Commissioner of Agriculture for the Dominion of Canada; the Honorable J. A. Murray, Minister of Agriculture for New Brunswick and the Hon. G. H. Murray, Premier of Nova Scotia.

Extra Mural Short Courses.

In addition to the Short Courses held at the College, five other Short Courses, each of three to four days duration, were held at the following places; Yarmouth, Bridgewater, Shubenacadie, Musquodoboit and Antigonish. The average attendance at all sessions, morning, afternoon and evening at these courses was 147. These Short Courses were conducted by the regular members of the College staff and no effort was spared to make them as thorough as they could be in the time available.

The Rural Science School.

There were 159 teachers in attendance at the Rural Science School held during July and August 1915. This School is conducted jointly by the staffs of the Agricultural and Normal Colleges and is the foundation of the agricultural education work which is now being introduced in the

N.S.A.C. Short Course Jan. 4th to 14th Truro, N.S.

Men's Short Course at Agricultural College, Truro, January 4th to 14th, 1916.

Schools of the Province. A full report of this Rural Science School will be found in the contemporary report of the Superintendent of Education of Nova Scotia.

The Faculty.

One member of the Faculty, Prof. B. H. Landels, who was Superintendent of the Drainage Department, is now in Flanders with the Princess Patricias. His position has not been filled but his work has been carried on partly by his Assistant, Mr. A. E. Humphrey, partly by Mr. J. M. Trueman and partly by Mr. Reek, Director of Agricultural Education for Prince Edward Island. I take this opportunity of publicly stating our appreciation of Mr. Reek's services, which were very highly valued by the student body.

Mr. C. A. Good, Assistant in the Zoological and Entomological Department, is now completing his officer's qualifying course and proposes going to the front as soon as opportunity is afforded. It is not our intention to fill Mr. Good's position but in the meantime at least, to make a special effort to carry on his work with the aid of the present staff.

Other members of the staff who have heard the "call to arms" are W. J. Bird, Asst. Dairy Supt. and Mr. A. E. Humphrey Asst. in the Drainage Dept. both of whom purpose going to the front shortly.

Mr. Howard Trueman, a graduate of 1915, has taken Mr. Sandford's place as Assistant in the Animal and Field Husbandry Department.

Improvements of the Year.

The outstanding feature of the year, so far as improvements are concerned, has been the completion of the Science Building. This building has afforded a much needed addition to the College equipment. Chemistry which was formerly taught in the limited quarters available at the Normal College, is now taught in the ample laboratories of this building. Entomology and Zoology, which were formerly crowded into the Horticultural Building, are given places in the new building. And Domestic Science and other lines of work for women, which were formerly housed wherever a spare class room could be found, are now accorded the finest floor in this the finest building on the College grounds. As a general description of this building appeared in last year's report, I will not add anything further but simply state that the building is most satisfactory in every particular and is a credit to the architect and the contractors. The building was formally opened on Jan. 11, 1916 by C. C. James, L. L. D., C. M. G. Agricultural Commissioner for the Dominion of Canada.

Improvements Needed.

A war year is not a good year in which to urge further appropriations for improvements and it is not my intention to urge such. In fact, it is most satisfactory to be in a position to report that our present equipment is ample in many respects for years to come.

Had the new Science Building not been erected we would have been hampered. Fortunately it was erected and as a result we now have a College plant at Truro capable of serving not only Nova Scotia but the adjoining Maritime Provinces as well.

Some time, a dormitory will have to be erected but unless some kind benefactor offers to construct such a building we will not urge the need until the war is over. The most urgent demand is one which was presented in my report of a year ago, namely, for a Field Crop Experimental Department with a specialist in Field Crops at its head. This work in the meantime is being carried on by Professor Trueman in connection with his duties as Farm Superintendent, but his other duties prevent him from giving the attention to the subject which its importance deserves. In discussing this question in previous reports I have pointed out that considerable of the work, which would come under the direction of a Field Crops specialist, is now being done at the Dominion Experimental Farm, Nappan. Personally I believe that the work conducted at Truro would be strengthened and the work at Nappan likewise if a closer federation were brought about and since this uniting of forces has already taken place in connection with the Seed Division and the Entomological Divisions at Ottawa, with the corresponding divisions in Nova Scotia, it seems reasonable to entertain the same idea about this other division also.

In the earlier reports from the College, it was not possible to include much more than a collaboration of what was being done elsewhere in the agricultural world. Fortunately, the new equipment and the larger staff have made it possible to undertake considerable investigation work. I consider the reports submitted by my colleagues this year to be in general the most valuable, especially from this view point, of any that have yet been published. I mention the fact here in order that the public may appreciate the importance of providing the instructors at the College with the facilities necessary for thorough work along agricultural lines. I need only add in this connection that the biggest demand at the institution from henceforth will be for further extension of the present facilities for work in each Department of the College.

CONCLUSION.

If the war continues, the "call to arms" will no doubt attract a still larger number of those who, in times of peace, would be students at the College and it may be that, so far as teaching is concerned, the functions of the College staff will be temporarily at an end. It is in this connection that the value of the College officials also taking charge of their respective lines of work in connection with the Department of Agriculture throughout the Province is to be especially commended. Even if teaching in the College were to be temporarily suspended, there would arise a correspondingly greater demand for the services of the members of the staff in promoting various lines of advanced agriculture through demonstrations, local short courses, crop competitions, the furthering of such organizations as creameries, cheese factories, etc., the prevention of insect and fungus pests and the many other lines of activities which a modern system of organized agriculture demands. However that may be, it is satisfactory to report that never in the history of the institution have I had a more efficient staff; never have their services been in so great demand and never has the College as a whole appeared to have been so much appreciated and made use of by the farming community of the Province. There are many lines of work not at present receiving adequate attention which I wish we he had the means to develop and I hope that the day may come when the finances of the Province will warrant a much larger appropriation for these purposes than is now available. In the meantime, it is the aim of myself and my colleagues to render the most efficient service we can. We join in thanking yourself as Premier and all those members of the Legislature who have given encouragement and rendered assistance in our various lines of activity. That the results already achieved may prove at least a partial reward for the care and anxiety involved in establishing this College of Agriculture is our sincere wish and that the future results may still more justify your efforts is our hope,

I have the honor to be, Sir,

Your obedient servant,

M. CUMMING,
Principal College of Agriculture.

PART 2—REPORT OF THE PROFESSOR OF BOTANY.

Nov. 1, 1915.

Principal M. Cumming, Esq.,

Sir:—I have the honor to submit my annual report upon the work of the past year. The instruction I have given in the College and Rural Science School is similar to that of the preceding year. As I stated this work fully in my last report I will not repeat it here. I have devoted my time when not teaching to further studies of plant diseases and also prepared for publication a bulletin upon some of the common plant diseases found in Nova Scotia of economic importance to farmers.

In this bulletin, I have collected information which is not readily available to our farmers elsewhere. I have given the chief characteristics of the diseases when necessary for their recognition, the habits of growth of the diseases and methods of control. I trust that it meets your approval and am sure that if the information it contains is utilized by our farmers it will be of value to them. In past years I have called attention to a few prevailing diseases each year and desire again to direct attention to losses suffered during the year and their prevention. This was a very wet season and furnished the best conditions for the growth of certain diseases. The early and repeated spraying for potato blights was of the utmost importance. The loss suffered in many localities was severe and could have been prevented. This applies not only to the loss from rot but the great loss from the death of the plants when the crop was only partly grown.

This was a good year for the spread of fire blight in fruit trees and the increase of cankers. The latter will only be evident another year. It should however emphasize the importance of thorough spraying, careful pruning with care that the tools are disinfected from tree to tree and that only smaller branches are cut off so that they can heal rapidly. The fruit grower should remember that the healthy tree is alive throughout and that when a branch is removed the tissues under the wound immediately begin to form cork tissue which protects the wound and that such tissue serves the same purpose as bark. Wounds on living wood do not have to be covered with the growth of callus in order to be healed. It is only where the heart or other part of a tree is dead that the growth of the callus furnishes protection and in such cases it is so slowly furnished that it is of little value as any injurious fungi would already have become established. In the same way any application like paint or preparations that would kill fungi would be liable to injure the cut surface and delay the formation of cork. The best treatment of wounds is either to cover with grafting wax or leave alone providing all projecting stubs are removed.

Two different diseases, one affecting the entire tree and the other only the twigs were very noticeable on the maples, probably on account of the exceptional season, These will be carefully watched the coming year in case they prove of importance.

Attention is called to my previous reports in regard to black rot of cabbage and turnip. Very great damage was caused by this disease this year in many localities. The same is true of clubroot and I desire to call attention to the recommendation of Mr. Cunningham of the Dom. Department of Botany that large and repeated applications of lime may be an efficient remedy.

Respectfully submitted,

H. W. SMITH.

PART 3—REPORT OF THE PROFESSOR OF ZOOLOGY AND PROVINCIAL ENTOMOLOGIST.

M. Cumming, B. A., B. S. A., Secretary for Agriculture.

Sir:—I hereby submit my 3rd Annual Report and the fourth Report of the Department of Zoology and Entomology of the Nova Scotia Agricultural College.

The work of the year intervening since the publication of the last report, will be discussed under the following headings:

(1) General; (2) Brown-Tail Moth Report; (3) Inspection of Nursery Stock Report; (4) Field Inspection Report; (5) Potato Inspection Report; (6) Apiary Inspection Report; (7) Experimental Report; (8) Cost of Inspection; (9) Conclusion.

General.

The regular classes in Zoology and Entomology with the Agricultural College students occupied a considerable portion of the time during the winter months. My assistant, Mr. Good, had charge of the laboratory work in Bacteriology, and this occupied the greater part of his attention. during the second term.

Important additions have been made to the insect collection, which is now being properly arranged for the first time. While no effort has been made to make a large collection, owing to the press of other work, quite a volume of material has accumulated, which will be of great value when made available for reference. A number of new life-history sets of economic insects have been prepared and quantities of material for class work collected. With the better facilities at our command, we are enabled to put on a more thorough and a more practical course than formerly.

The number of specimens sent in for determination, and our correspondence generally, continues to increase. Correspondents are encouraged to apply to us for information on entomological subjects, and a continued effort has been made to popularize our work by regular contributions to the agricultural and general press. A number of farmers' meetings were addressed and a few orchard demonstrations held to further keep the public in touch with our subject.

No special features in the way of unusual insect outbreaks have occurred. The pests that have been sent in are, for the most part, those insect enemies, the names of which come up year after year in our reports. Our knowledge of many of these common forms continues to increase, and methods for dealing with those which have not been satisfactory controlled in the past, are gradually being perfected.

Besides addressing various gatherings of fruit growers, the writer spoke once to the Halifax and Dartmouth teachers, once before the Halifax County Teachers Institute, and also read a paper before the Ontario Entomological Society. During the year a Nova Scotia Entomological Society was organized and a meeting held during the session of the Rural Science School at Truro. In the organization of this society, which is certain to have an effect in promoting the practical and educational phases of entomology, the writer has had the help and encouragement of Mr. Geo. E. Sanders, of the Dominion Entomological Branch, Dr. A. H. McKay, Superintendent of Education, Prof. L. A. DeWolfe, Director of Rural Education, Inspector Creighton of Halifax, E. Chesley Allen of Yarmouth, and others. With such strong support, the new society is assured of a successful future.

My holidays, taken during a portion of February and March, were utilized in a short visit to Cornell University, where certain lines of work were pursued, for which the limited entomological library and reference collection at the College does not afford facilities. Subsequently, at the invitation of the Bermuda Government, three weeks were spent in that Colony. Here my time was employed in gaining information to assist in intelligently applying the new regulations, having to do with the potato trade between Nova Scotia and Bermuda. At meetings held at various points throughout the Colony, the facts of the matter from the Nova Scotia standpoint, were presented.

Much of the credit for the successful seasons' work should be accorded the inspectors and others associated with me in the work of the department, on whose loyal support I have always been able to count. Mr. C. B. Gooderham, carried on the work at Truro in the summer months during my absences, very acceptably. Mr. C. F. U. Whitman has been appointed to take charge of the inspection station at Digby. When the station is not in operation he will be engaged in field inspection and assisting in spraying experiments. Mr. H. G. Payne has taken charge of the Truro Inspection Station. During the summer months he will be engaged in field work and the balance of the year in arranging the College collection. Mr. L. G. Saunders, besides assisting in the inspection and laboratory work, has acted as artist to the department and has prepared a number of illustrations that will materially increase the value of our publications. Mr. W. E. Whitehead has also helped along this line in his spare moments. Mr. C. A. Good left on Nov. 1 to take the officers training course at Halifax and expects to join the overseas forces in the near future.

It is gratifying to record that the close co-operation which has existed between our department and the Dominion Entomological Branch continues in operation. Mr. Sanders, the field officer, and myself, are carrying out an extensive series of insecticide investigations and plan on further work in the future. In this way we are able to do more efficient work at a greatly reduced cost.

We were fortunate enough to secure the service of Prof. W. P. Fraser of MacDonald College for three months during the summer, to assist us in our field work in plant diseases. As there is a great demand for information along these lines throughout the country, Prof. Fraser's advice was of great assistance to me, and our inspectors benefited materially by his presence among them.

Brown Tail Moth Report.

The following is the Brown Tail Moth report for the season of 1914-15. It has been compiled from the reports of the inspectors and from a summarized report submitted to me by Mr. G. E. Sanders, under whose immediate supervision the work is carried on.

The task of controlling the Brown Tail Moth was continued under the same conditions as in previous seasons, five men being employed by the Provincial and five by the Dominion Government.

The area of infestation is approximately the same as last year. The most heavily infested territory extends from Bear River to Bridgetown, the moderately infested from Metaghan to Kingston and the lightly infested from Yarmouth to Kingsport, along the north shore of Nova Scotia.

The total number of nests taken during the season was 18154, a decrease of 6002 nests from the previous year. In all 155 localities were found to be infested, as compared with 257 the previous year. 131 localities infested the the previous season were found free this year, while 29 of the 155 localities where brown-tails were found this year were new infestations. In Shelburne County, where 28 nests were found widely scattered in 1913-14, only one was found in 1914-15. No nests were found in Cumberland County this year, whereas two were discovered the previous season. A few nests were found on the shore of Minas Basin in Hants Co., which may or may not mean a permanent infestation in that county.

The large relative decreases were secured in Digby, Yarmouth, and Shelburne and Kings Counties. In Annapolis, the situation varied in the different localities, giving on the whole a slight decrease.

From November 1st until May 1st the inspectors were employed as follows:

H. G. Payne of the provincial department was employed as scout during the early part of the season, to locate the heavily infested localities, so that the inspectors might work to best advantage in getting off the most nests in the shortest possible time. Later he was employed as scout to look up new infestations covering Queens, Lunenburg, Hants and Cumberland Counties.

F. C. Gilliatt, Foreman of the Dominion Entomological Branch and W. L. Harris, inspector of the provincial department, worked in the district from Bridgetown to Kingston during November and December. They then covered Yarmouth, Shelburne and the Bay shore of Annapolis County returning to finish the season in the territory first covered.

S. H. Payne, foreman of the Dominion Entomological Branch and L. G. Saunders, inspector of the Provincial Department worked in Annapolis and Moschelle during the months of November and December, then covered Digby County and, on their return, they gave a second inspection to the district between Bear River and Annapolis. On returning from this they finished the season in the territory first covered.

L. FitzRandolph, foreman of the Provincial Department, and V. A. Chute, inspector of the Dominion Entomological Branch, covered the district from Round Hill to Bridgetown during November and December, continuing east to Kentville after January 1st, then returning to their first district for the remainder of the season.

C. F. U. Whitman, foreman of the Dominion Entomological Branch, W. E. Whitehead, inspector of the Provincial

Department, and T. H. H. Fortier of the Dominion Entomological Branch, covered the District from Bear River to Annapolis during November and December. They then continued east as far as Bridgetown after January 1st, then returning to their first district for final inspection. In March T. H. H. Fortier resigned and his place was filled by T. H. How.

By arranging the parties in this way most of the heavily infested territory was covered three times—twice by the party responsible for the district and once by another party, to check the work of the others. Most of the moderately infested territory was covered twice and the lightly infested territory once.

The following table gives the total nests taken by counties. The list of localities where the nests were taken and the number occuring in each since the inspection was first undertaken, has been prepared and is now on file in my office. It is available for reference to anyone who wishes to learn the history of the pest in his locality:—

Yarmouth..........	....	12	10	3	1007	73
Digby..............	414	3004	3688	5064	7699	5460
Annapolis...........	1070	1444	4333	5882	14572	12154
Kings................	....	2	39	105	845	554
Hants...............	....	....	....	1	1	12
Cumberland.........	....	....	....	.....	2	.....
Shelburne...........	....	....	....	.....	30	1
Locality Unknown...	12	....	....	.....	.....	.....
	1496	4462	8070	11054	24156	18154

Apple	15524
Pear	839
Thorn	835
Plum	285
June Berry	319
Oak	223
Maple	14
Rose	5
Elm	26
Sweet Cherry	41
Birch	3
Miscellaneous	40
Total	18154

The following table shows the old nests found in Nova Scotia during the season of 1914-15 which had been missed the previous year:—

Round Hill	21
Annapolis	15
Tremont	6
Mosher Cor.	5
Bear River	4
Mochelle	3
Bridgetown	3
Auburn	2
Saulnierville	2
Meteghan River	2
Margaretville	2
Deep Brook	1
Spa Springs	1
Kingston	1
N. Kingston	1
Williamston	1
Yarmouth	1
Belliveau Cove	1
Mistake Sett	1
Nictaux	1
Somerset	1
Grosses Coques	1
New Edinburgh	1
Coldbrook	1
Canning	1
Delusion	1
Port George	1
Hanley Mt. Rd.	1
Forest Glade	1
Prince Albert	1
Port Lorne	1
	85

Increase from old nests:—39 old nests were found isolated with the progeny, if any, clustered near. These totalled 246 new nests, or an average increase of 6.3 from one and as some would undoubtedly blow away, the actual increase was probably above this figure.

The following table shows the localities infested with Brown-tail moth in 1913-14 but found clean in 1914-15.

Locality	Nests.	Locality	Nests
Wellington	42	Overton	6
Milton	42	Plymouth Sta	6
Springdale	37	Forest Glen	6
W. Deerfield	29	Parker Mt.	6
Raynardville	23	Little River	6
North Range	22	Egypt	6
Lakeside	21	Glenwood	6
Lake George	21	Lower Eel Brook	5
Summerville	20	Quinan	5
Rockville	16	Bell Neck Rd.	5
Tusket Wedge	15	Graywood	5
Brazil Lake	15	Waterford	5
Sand Beach	13	Gardeners Mills	5
Reynard Brook	12	Gullivers Hole	5
D'Entremonts	11	Kelly Cove	5
South Range	11	Millville	4
Bayview	11	Tusket Falls	4
St. Bernard	10	Westport	4
South Canaan	10	Centreville	4
Hillgrove	10	Moody Cor.	4
Tusket	9	W. Belliveau	4
Melanson Sett.	9	Church Pt.	4
Beaver River	9	Gavelton	4
Hillview	8	Inglisville	4
Jordantown	8	Wedgeport	4
Ashmore	8	Lr. W. Pubnico	4
Plymouth	8	Barrington Pass	4
East Pubnico	7	Jordan Falls	4
Argyle	7	Comeau Hill	4
East Chebogue	7	Eel Brook	4
Sissibou Falls	7	St. Joseph	4
N. Kemptville	7	Bear Cove	3
Norwood	7	Hilltown	3
Spring Haven	7	Corberrie	3
Roxville	7	Havelock	3
Bloomfield	7	East Kemptville	3
Rossway	6	Pleasant Val. C	3

Locality	Nests
Mount Pleasant	3
Short Beach	2
Black Pt.	2
Sea Brook	2
Lakeville	2
Mink Cove	2
Bellville	2
South Bellville	2
West Pubnico	2
Birchtown	2
Lockport Sta.	2
Churchover	2
Minasville	2
Minasville	1
New Prospect	1
Diligent River	1
Frasertoen	1
Big Port Hebert	1
Lockport	1
Rockland	1
Gunning Cove	1
Upper Ohio	1
Sand Pt.	1
Victoria Harbor	1
Victory	1
Villagedale	1
Oak Hill	1
Barss Hill	1
Cape Sable Island	1
Upper Woods Harbor	1
Lower East Pubnico	1
Middle West Pubnico	1
Pubnico	1
Centre Argyle	1
Robert Island	1
West Springhill	1
Virginia	1
Princedale	1
Pereau	1
Birchtown, Anna. Co.	1
Victoria Beach	1
Canard	1
Upper Dyke Village	1
Perotte	1
Milford	1
Southville	1
Easton	1
Hassett	1
Coldbrook	1
Seawall	1
Tiddville	1
Lawson Cor.	1
Cambridge	1
North Waterville	1
Total	600

Thus 131 localities giving a total of 600 nests in 1913-14 were found clean in 1914-15.

The following table shows the new infestations of Brown-tail moth in Nova Scotia, season 1914-15.

Locality	**Nests.**
Mosher Corner	80
E. Margaretville	26
Prince Albert	22
Forest Glade	14
Vault Rd	12
Welton Cor.	11
Summerville, Hants	10
Hillaton	8
Canning	8
Litchfield	7
Welsford	7
Harmony	5
Doucet Lake	5
Lower Granville	4
Youngs Cove	4
Grafton	3
Woodstock	3
Mayflower	3
Harborville	2
Dempsey Corner	2
Pembroke Shore	1
Bishop Mt.	1
Auburn Mt. Rd.	1
Burlington	1
Garland	1
Prospect	1
Bloomington	1
Cambridge, Hants	1
Tennycape	1
Total	245

Thus 29 localities yielding a total of 245 nests were found during 1914-15, where none had been taken the previous season.

In summarizing up we may say that the brown-tail moth situation is on the whole fairly satisfactory. The campaign for more spraying carried on by the two departments, so ably assisted by the influence of the United Fruit Companies, and the Dominion Fruit Inspectors, has borne fruit in a considerable increase in the amount and thoroughness of the work done. Still more work must be done along this line if the best results are to be obtained, for it is to this method that we must look to affect any permanent decrease in the brown-tail moth infestation. Unfavorable seasons may occasionally intervene on our behalf, as for example, the heavy mortality occasioned by the severe winter of 1914-15, but this cannot in itself afford more than a temporary setback to the pest. The work of the Dominion Entomological Branch in introducing and increasing parasitic and predaceous enemies of the brown-tail moth, which is proceeding as fast as the nature of the work will permit, will no doubt in the end prove an important factor in control, but, from the nature of the work, no immediate or spectacular results can be expected. In the infested area the heaviness of the infestation varies with the amount of spraying done and our only hope of keeping the pest within its present bounds is to increase the amount of spraying in infested localities and the surrounding districts.

Inspection of Nursery Stock.

This season we continued our work of inspecting imported nursery stock as required by the provisions of the Destructive Insect Pest and Plant Disease Act, 1911, and the regulations issued thereunder. The shipments last season, as was to be expected, were light, but nevertheless it taxed our facilities to dispose of all shipments as promptly as necessary. The fact that nursery firms doing business with Nova Scotia put off their shipments until the last possible moment makes our work doubly difficult and we are in urgent need of having our plants enlarged, particularly at Digby, where our work is now carried on under very unfavorable conditions. Such enlargements should be arranged for, and accomplished before the return to normal conditions and consequent larger importations.

That this work is necessary in order to protect Nova Scotia from further importations of San Jose Scale is shown by the fact that, with only two exceptions, we have found scale on the stock of all firms shipping to this province. The scale was not alive in most cases, but experience has taught us to regard with suspicion all scale infested trees. Cases have been brought to our attention where the insect has remained alive after having been fumigated twice. Under what conditions the fumigation was done, we of course have no knowledge.

Our work has been made difficult in the past by ignorance of the Act on the part of importers and mistakes by various railway officials, but these matters are now righting themselves, and it is believed that all the various difficulties have been satisfactorily solved. As for the expense connected with the inspectors this is being met to some extent by the new schedule of inspection fees that has now gone into force. This placed part of the burden where it belongs, viz., on the importers of stock. These fees yield us a return of $240.70 during the spring inspection season. When shipments of nursery stock return to their normal level the same rate should give a return more nearly commensurate with the cost of the inspection.

Field Inspection.

The field inspection began upon the close of the nursery stock inspection and continued throughout the summer. The following spent all their time at this work: F. C. Gilliatt, J. P. Spittall, C. F. U. Whitman and L. M. How. W. P. Fraser of MacDonald College helped us in our field work in plant diseases from July 15th until Sept. 15th. L. M. How resigned on Aug. 1st, having enlisted for active service with the overseas forces. C. A. Good, H. G. Payne, W. E. Whitehead and L. G. Saunders also spent some time at this work, but a good proportion of their time was occupied in helping with the experimental work which the department is carrying on.

The chief function of the field inspection is to locate and destroy any cases of San Jose Scale imported previous to the passing and rigid enforcement of the Destructive Insect Pest and Plant Disease Act, 1911. However, the inspectors were especially instructed not to confine themselves to this work alone, but to hold themselves ready at all times to give information to farmers and fruit growers along entomological lines. An effort was made to keep all our inspectors in close touch with the best information regarding the control of farm pests as well as with the research work that this department is carrying on. In this way they were able to give farmers and fruit growers the very latest advice regarding this subject.

As far as the San Jose Scale is concerned the result of our inspection is shown in the following table, other years being given for comparison:—

	1912	1913	1914	1915
No. of trees of 1910 planting destroyed............	7	0	0	2
1911	339	6	1	0
" 1912 " "	377	45	2	3
" " 1913 " "	0	6	0	1
" " 1914 " "	0	0	0	0
	723	57	3	6

The foregoing table emphasises the effectiveness to date of the inspection at port of entry, all the infested trees discovered having been imported before this was instituted.

In addition to this we received a mass of information regarding the orchards of Nova Scotia which is of inestimable value to us. In fact our inspectors during the past few years have taken what is in effect a very complete census of the extent and condition of the fruit industry in this province, probably the most complete in existence. This report is not the place to detail all the information secured, but the following table will give the extent of our inspection and in addition shows how much of the orchard land inspected is sprayed at least once:

Total number of properties inspected	2,746.00
Total acreage (approximate) in orchards	13,714.00
No. of fruit growers who spray at least once (we do not request no. of sprayings).	935.00
No. of fruit growers who do not spray	1,812.00
Percentage that spray	34.07
Acreage of orchard sprayed	10,200.00
" " " not sprayed	3,514.00
Percentage of orchard not sprayed	74.15

Late in the season we made a special inspection in these districts where apple maggot is known to be found. The results of our inspection brings out many interesting points regarding this insect. The information gained is given in the following tables:

INSPECTION RESULTS FOR DIGBY COUNTY.

(A. 1914)
(B. 1915)

A.

Locality	No. Tees Inspected.	No. of Trees Infested.	No. Properties Inspected.	No. of Properties Infested.	Total Acreage Inspected.	Total Acreage Infested.	No. of Sprayed Orchards.	No. or Sprayed Orchards Infested.	No. of Unsprayed Orchards.	No. of Unsprayed Orchards Iufested.	No. of Trees Infested in Sprayed Orchards	No. or Trees Infested in Unsprayed Orchards.	Non-Bearing Trees.
Acaciaville	2267	436	29	18	39.85	36.32	0	0	29	18	0	463	.....
Bear River	6134	111	109	19	157.3	37.	4	1	105	16	1	110	.....
Clementsport	516	0	26	0	16.2	0.	0	0	26	0	0	0	.....
Deepbrook	2903	49	55	16	67.6	12.14	3	1	52	10	18	31	.....
Digby	1242	46	31	4	22.5	9.75	1	1	30	3	32	14	.....
Hillgrove	627	0	9	0	21.5	0.	0	0	9	0	0	0	.....
Joggin Bridge	1184	70	32	8	17.6	13.15	0	0	32	9	0	70	....
Jordantown	100	1	6	1	12.	.5	0	0	6	1	0	1	.....
Lansdowne	1475	17	13	5	26.8	9.7	1	0	12	5	0	17	.....
Marshalltown	622	0	21	0	11.2	0.	0	0	21	0	0	0	.....
Smith's Cove	2791	38	42	18	38.7	23.25	0	0	42	17	0	38	.....
Totals	19861	795	373	89	431.25	141.81	9	3	364	79	51	744	.....

B.

Acaciaville	1418	432	34	28	31.6	29.	...	...	34	28	...	432	
Bear River	6373	196	169	29	220.6	62.	5	5	164	24	17	179	162
Bloomfield	128	...	7	...	2.5	......	...	...	7	...	...	...	4655
Clementsport	450	...	26	...	24.3	......	...	...	26	...	...	...	768
Deepbrook	3372	10	66	4	110.5	10.	..2	2	64	2	8	2	2157
Digby	1026	25	42	5	28.8	3..	...	...	42	5	...	25	418
Hillgrove	182	...	6	...	3.6	......	...	...	6	...	...	...	.....
Joggin Bridge	534	37	20	12	16.5	12.	...	...	20	12	...	37	295
Jordantown	91	5	8		1.8	1	...	...	8	2	...	5	.....
Lansdowne	114	...	4	...	11.9	......	...	...	4	...	...	...	482
Marshalltown	283	1	13	1	5.6	.	...	...	13	1	...	1	.....
Smith's Cove	2846	89	45	19	68.1	34.	...	...	45	19	...	89	560
Waldeck Line	229	...	15	...	20.9	......	.	...	15	...	...	...	820
	17046	795	455	100	546.7	153.	7	7	448	93	25	770	1031

INSPECTION RESULTS FOR THE WINDSOR DISTRICT IN 1915.

Locality.	No. of Trees Inspected.	No. of Trees Infested.	No. Properties Inspected.	No. Properties Infested.	Total Acreage Inspected.	Total Acreage Infested.	No. Sprayed O.chards.	No. Sprayed Orchards Infested.	No. Unsprayed Orchards.	No. Unsprayed Orchards Infested.	No. Trees Inested in Sprayed Orchards.	No. Trees Infested in Unsprayed Orchard.
Windsor	4479	353	29	25	86	68¼	6	6	23	12	153	191
Falmouth	12325	33	38	10	180	52	23	6	15	1	12	17
Martock	1434	8	11	3	37	5	0	0	11	0	0	8
Horton Blf.	1050	0	4	0	21	0	0	0	4	0	0	0
Lockhartville	691	0	4	0	14	0	0	0	4	0	0	0
Newport Station	42	0	3	0	¾	0	0	0	3	0	0	0
Mapleton	334	12	21	3	68½	43	0	0	21	3	0	12
Hantsport	2744	50	24	9	54½	34½	5	4	21	1	26	24
Mt. Denson	6308	17	33	8	150	62½	4	3	28	0	12	5
Windsor Forks	5430	32	20	5	257	25½	11	1	9	0	21	8
Newport	45	0	2	0	1½	0	0	0	0	2	0	0
Newport Corner	569	5	18	3	24½	5½	0	0	2	0	21	8
St. Croix	271	7	3	3	5¼	5¾	0	0	3	3	0	7
Brooklyn Road	306	1	8	1	5¼	0	0	0	8	1	0	1
Ellershouse	175	1	3	1	10¼	6	0	0	3	1	0	1
Wentworth	825	0	9	0	16½	0	0	0	9	0	0	0
Totals	36998	519	230	61	831	307½	49	16	182	28	224	279

By a comparison with last year's report it will be seen that the amount of territory covered was less than last year. This is due to the fact that not only did we have less men for the work, but also because of the additional assistance required in our experimental work. I am convinced that while the inspection work will be necessary for some time to come, we can accomplish more valuable and more permanent results by concentrating our attention on the keeping out of further infection and covering the country every two or three years, instead of every year, as formerly. We will then be able to spare more men to help in our experimental work, which will continue to grow as time goes by. By extending our system of field stations, we can use them as a centre for experimental studies, as well as for the dissemination of information regarding injurious insects. Our experience has taught us that the farming public soon learns of the existence of the laboratory, and get in the habit of bringing in specimens or otherwise applying for assistance.

Potato Inspection.

This year we had to inspect Garnet Chili potatoes for the Bermuda trade as usual, and certify their freedom from disease or otherwise. In addition to this the Bermuda authorities further require a field inspection of all fields of potatoes destined for seed purposes for use in that Colony. This they regard as even more important than the inspection for disease, since their farmers have suffered grievous loss from the use of degenerate of "run-out" seed. For this reason, seed from all potato fields showing decided evidence of weak or degenerate stock are not desired in Bermuda, and hence their new regulations. It was therefore necessary for us to take over this added work if our farmers were to continue to ship to Bermuda.

Inasmuch as this inspection could profitably be used as a medium for an active educational campaign for general potato seed improvement, so badly needed in this Province we were glad to co-operate with the Bermuda authorities in this matter. Mr. Wortley, Director of Agriculture for Bermuda, himself assisted in carrying on the inspection, and Mr. Paul Murphy, of the Dominion Division of Botany also accompanied the party. Every field where Chili potatoes were grown was visited and the inspection made. As a result of this inspection, it was clearly shown that many of our farmers were growing this crop at a loss on account of degenerate stock. Large numbers were convinced of this fact as a result of our visit, and many who were led to believe that the stock could be improved by proper hill selection, adopted this method for the first time. Meetings were held at Grand Pre, Clifton, Church St., and Centreville, and seed centres for the improvement of the stock grown were formed at the last three places. Credit for this is largely due to the efforts of Mr. Paul Murphy, who did valuable propaganda work along this line. It is to be hoped that the Dominion Government will see fit to continue this much-needed work in future seasons.

There was a considerable shortage in the Garnet Chili crop last year, due to the late season and the prevalence of Late Blight (Phytophthora infestans). Further, very few white potatoes were shipped; so that during the past autumn our inspectors only examined approximately 7000 barrels, as compared with 15,000 last year. As with our other inspection, however, emphasis was laid on the educational side of the work, the inspectors endeavoring to point out evidence of disease, mixtures, etc. Next year we hope that this work will be taken over by the Dominion Department of Agriculture, as it comes at a very awkward time of the year for us, when our inspectors should be engaged elsewhere. Furthermore as it is a matter of international trade, we feel that it more properly comes under the jurisdiction of the Dominion Authorities.

Apiary Inspection Report.

In consequence of the discovery of American Foul Brood in certain apiaries in the Cornwallis District, there has been a considerable demand for competent apiary inspection to localize the outbreak, and, if possible, stamp it out. The Maritime Beekeepers Association and the Nova Scotia Fruitgrowers Association both passes resolutions asking that a Foul Brood Act be passed and an inspector appointed.

As no work of this kind had ever been undertaken in Nova Scotia, we had no data regarding the value of the bee industry, we did not know how widespread was the disease and we had no trained man immediately available for carrying on the work. It therefore seemed advisable to secure the services of some one with experience in this matter to investigate and write a report of his findings, before any action should be taken.

We were fortunate enough to secure the services of Mr. Morley Pettit, Provincial Apiarist for Ontario. Mr. Pettit, who was accompanied throughout his trip by myself or another member of the department, spent several days in the province visiting sufficient beekeepers to discover the limits of the foul brood infestation. Lists of beekeepers had previously been secured from the various bee supply firms and these proved of very material assistance in carrying on the inspection.

Mr. Pettit went away very enthusiastic regarding the prospects for beekeeping in this province, as the following extract from his report will show:

"Wherever I went in Nova Scotia where farming is practised, I found bee pasturage, with the possible exception that perhaps the light sand is comparatively worthless for bees, as I was repeatedly told that buckwheat, which is our main honey crop on sand, does not yield honey to any extent in Nova Scotia. But where the soil is good, willow, alder, maple, elm and of course fruit blossom give excellent material for spring building up; then wild radish and clover, give the main crop with golden rod, willow herb and other fall flowers to finish off on. It seems that in Nova Scotia, the honey from their fall flowers is quite good enough to go in with the clover. This is a great advantage, eliminating, as it does, the extra labor of keeping light and dark honey separate.

But the vast expanses of white and alsike clover on the reclaimed land along the tidal waters was the most wonderful display I have ever witnessed. I am well aware that this is an exceptional year and that last year was a failure of clover, but I was told repeatedly that the average year would show more than half the quantity of clover seen this year. Judging by that an exceptionally good location in Ontario supporting 250 to 300 colonies in one apiary and yielding 25,000 to 30,000 lbs. of honey would not show as much alsike and white clover within a two or three mile radius as any point along the dykes lands of Nova Scotia, because with us clover fields are interspersed with fields of grain, etc. It is fortunate for beekeepers that red clover is not very successfully grown in your province.

As far as I can learn your climate is quite satisfactory, bees winter with no extra protection whatever, although I have no doubt they would respond to greater care. The greater moisture keeps the blossoms fresh and productive, and the heat during the day is sufficient for nectar secretion. The fact of the summer season being short is not detrimental as the season of honey production is usually only a few weeks at best. Although this season has been especially cool, bees which are given any attention are giving large yields of honey, and colonies which have not had supers or have section supers put on in such a way as to be unsatisfactory to them, are cramming with honey every available space in the brood chamber.

I would say that by a conservative estimate apiaries of 100 colonies each, managed for extracted honey might profitably be placed at three mile intervals over the whole of the dyke lands, and much of the uplands, and that average yields of 50 to 100 lbs. per colony might be expected.

The next question would be—What about markets? There is only one answer—Advertize? You have of course observed that it is the rarest exception to get honey for dessert on any Canadian table, public or private. I need not enlarge on its value for that purpose, yet no one is saying anything about it in public. In the United States, one firm, by their own published statement, spent $25,000.00 in newspaper and magazine advertising of their particular brand of honey last year. They have found it profitable and are continuing the campaign. You have the machinery for selling honey in your fruit growers' organization, and your honey when properly taken and prepared for market is equal to the finest in the world.

In view of the present great need for increased production of food, I may say that there is no field where production can be increased more rapidly than in Agriculture. The product is a sweet—so much needed by soldiers in campaign—and being partially digested is more wholesome than any other sweet that can be sent to the men in the trenches. The New Zealand Government is sending large quantities put up in 1 lb. and ½ lb. tins for this very purpose.

There seems to be only one disease area in Nova Scotia. There are quite a number of small apiaries principally kept for the benefit of fruit trees, but the largest apiaries I found did not contain more than 50 or 60 colonies, and the idea of launching out into beekeeping as a speciality, counting colonies by the hundreds does not seem to have penetrated anywhere. It is a monumental example of a sleeping giant.

What your beekeepers need is an educational campaign. They all seem to be anxious to learn, but very few are really taking it seriously. By modern methods of swarm prevention, etc., one man with a couple of unskilled helpers can look after 500 colonies, with the above mentioned average returns. That would probably compare favorably with cutting hay, or even growing apples, especially when the capital investment and running expenses are compared."

Mr. Pettit, further recommends that an Act for the control of bee diseases should be passed and an appropriation provided to administer the same. In his opinion, this inspector should be a man with a wide practical knowledge of beekeeping, as well as of bee diseases, who could work under the direction of the Provincial Entomologist. He thinks that ultimately we should aim to have this man devote his entire attention to agriculture.

In view of the splendid possibilities for beekeeping in this province, of the very real demand for apiary inspection, and of the fact that other provinces have already preceded us in this important line of work, I feel that we could not do better than to accept Mr. Pettit's advice. Accordingly I would like to add my recommendation to his, that arrangements be made to pass a Foul Brood Act and an appropriation provided for administering the same. After a careful study of other Acts and with advice from competent authorities I have drawn up a preliminary draft of such an Act for the reconsideration of the proper authorities.

Experimental.

This is the first season that experimental work on any scale has been possible. The previous summer was spent in ascertaining what the problems really were, and planning methods of attack. During the past summer, however, a very promising start has been made and we are in a position to report marked progress along several lines.

The two chief lines of work undertaken were those having to do with the investigation of the Green Apple Bug (Lygus invitus) and the Apple Maggot (Rhagoletis pomonella), the former carried on with the Kentville Laboratory as a centre and the latter with the Smith's Cove Laboratory as a centre. In the case of the Green Apple Bug, we were able to work out the life-history of the insect, make numerous observations regarding its habits, proved its importance as one of the chief fruit pests of Nova Scotia and outlined a method which we believe will be successful in bringing it under control. This side of the work will be continued on a large scale next spring. A full report of the results of our work to date will be published in the Annual Report of the Ontario Entomological Society

As regards the apple maggot, extensive experiments were undertaken to determine the various points in regard to its habits, life-history and methods of control. An inspection was also made of the centres where outbreaks are known to have occurred, and the range of the pest determined, observations being taken at the same time to discover under what conditions the pest flourishes best and what varieties are most subject to attack. Altogether the mass of information secured was considerable and the results of spraying with the sweetened poison was altogether strikingly successful. This work was carried on by my assistant, Mr. C. A. Good, and we have reason to feel gratified with the results of the work. A single season's results, are of course, not conclusive, and this investigation will be continued for at least one more season. The results of this season's spraying experiments in the Windsor and Digby Districts are showing in the following tables:—

District	No. of orchard.	Treatment of orchard.	Variety of apple.	No. of apples examined.	Percentages apples having one or more punctures.	Calculated number of punctures per 100 apples.	REMARKS.
Windsor	1	Sprayed twice for apple maggot.	Graventein	7647	13.18	22.2	Sprayed a few days too late; flour paste used.
“	2	Sprayed twice for apple maggot.	Gravenstein.	7243	13.08	26.3	Sprayed a few days too late; flour paste used.
“	3	Sprayed twice for apple maggot	Gravenstein.	6124	2.25	3.2	Sprayed at the same time but without flour paste.
“	4	Unsprayed	Gravenstein	7022	53.07	154.6	
“	5	Unsprayed	Gravenstein	4980	54.76	154.4	
“	2	Sprayed twice for apple maggot.	King	2003	6.54	9.03	
“	1	Sprayed twice for apple maggot.	King	2510	1.23	1.3	
“	5	Unsprayed	King	1810	35.58	83.2	
“	2	Sprayed twice for apple maggot	Stark	404	1.73	1.73	
“	1	Sprayed twice for apple maggot	Stark	1279	.39	.46	
“	4	Unsprayed	Stark	1467	4.9	5.2	
“	2	Sprayed twice for apple maggot	Alexander	57	1.75	1.75	Very few Alexanders.
“	4	Unsprayed	Alexander	660	49.84	145.3	
“	2	Sprayed twice for apple maggot	R. I. Greening	2450	4.0	4.6	

"	1	Sprayed twice for apple maggot.....	R. I. Greening..	8200	2.81	3.3	....
"	4	Unsprayed..........	R. I. Greening..	2200	13.86	18.2	....
"	2	Sprayed twice for apple maggot.....	Baldwin.......	4687	2.28	2.5	....
"	1	Sprayed twice for apple maggot.....	Baldwin.......	2756	2.11	2.2	....
"	1	Sprayed twice for apple maggot.....	Blenheim......	1044	14.84	22.22	Best apples sold without our knowledge.
"	5	Unsprayed..........	Blenheim......	2605	32.28	69.7	....
Digby.	1	Sprayed twice for apple maggot.....	Gravenstein....	154722	5.93	8.6	....
"	2	Unsprayed..........	Gravenstein....	1991	96.78	292.2	Sprayed with the 4 regular orchard sprays only
"	3	Unsprayed..........	Gravenstein....	6900	85.58	190.	....
"	4	Unsprayed..........	Gravenstein....	3274	98.65	510.8	....
"	5	Unsprayed..........	Gravenstein....	192	96.35	696.9	Very few apples.
"	1	Sprayed twice for apple maggot......	Baldwin.......	1400	1.21	1.28	....
"	4	Unsprayed..........	Baldwin.......	1750	28.91	42.9	....
"	2	Unsprayed..........	Baldwin.......	6200	10.17	11.9	....
"	1	Sprayed twice for apple maggot	Blenheim......	1831	5.57	6.06	....
"	4	Unsprayed..........	Blenheim......	6083	66.95	152.4	....
"	1	Sprayed twice for apple maggot......	Unknown yellow sweet....	400	7.0	7.0	....
"	2	Unsprayed..........	Unknown yellow sweet....	200	56.5	98.5	....
"	5	Unsprayed..........	Unknown yellow sweet	6554	99.25	611.	....

Another line of work to which we have devoted a good deal of attention is a study of the three species of aphids which infest apple orchards in this province, viz. the Green Apple Aphis (Aphis pomi); the Rosy Apple Aphis (Aphis sorbi) and the Woolly Apple Aphis (Eriosoma lanigera). The life history of these insects, the conditions which favor their increase, and certain problems in their control have been worked out in some detail. The results of our studies will be published in the transactions of the Nova Scotia Entomological Society.

Other fruit pests of lesser importance have also been given attention and a beginning made with the study of vegetable insects. Suitable illustrations of the insects and their work have been prepared and when the time comes to issue the results of our work in the form of a departmental bulletin, we will have some new and valuable facts to communicate.

The results we have obtained with our field inspection, as well as the success attending our efforts to keep our further importations of infested nursery stock, encourages us in the belief that hereafter we will be able to devote less effort to field inspection and give more attention to the study of the control of pests already with us.

In view of the losses occasioned by various vegetable insects, and the fact that little has been done in this line in Nova Scotia, it would seem that more attention should be given them in future. Last summer Mr. Good, acting under my instructions, visited Yarmouth County, and investigated this question. From the impression he gained it appears that the vegetable growers in that neighborhood will appreciate assistance in the matter of fighting the various insect pests that attack their crops. I would accordingly recommend that if at all possible a field laboratory be established in the vicinity of Yarmouth, for the investigation of problems relating to the control of vegetable insects.

The experiment begun at Bridgetown last year for the purpose of securing accurate statistics as to the cost of spraying apple orchards and the financial returns that may be expected, was continued. The orchard was sprayed four times, once when the bud tips were showing green, once just before the blossoms opened, once just after the blossoms fell, and one two weeks later. The spray was applied by Mr. F. H. Johnson, who did the work the same as in his own orchard, no attempt being made to give it any extra care. In comparing results the entire crop from 10 sprayed Golden Russets and from 10 unsprayed

Golden Russets was picked and marked separately, and the same with 9 sprayed and unsprayed Kings. The results are strikingly as shown in the accompanying table:

Results of Spraying in Experimental Orchard, Bridgetown, in 1915.

No. of Trees	Variety	Treatment	No. of Bbls. Picked.				Total price received
			No. 1	No. 2	No. 3	Culls	
10	Golden Russets	4 times	7	3	2	4 bus	$24.60
10	Golden Russets. sets.	Unspray'd	1	1	2	2 bus	6.95
9	Kings	spray'd 4 times	21	3	2	3 bus	56.05
9	Kings	Unspray'd	2	1	4	4 bus	11.50

The table shows that the chief loss from not spraying was in the reduction of the set, caused chiefly be apple scab but also due in part to budmoth and fruitworms.

The percentage of injury from the foregoing and other pests on the picked fruit might be given, but would give little information since most of the injured fruit was prevented from reaching maturity. Deducting the actual cost of spraying, the gain from spraying the ten Golden Russet trees was $14.90 and from spraying the nine Kings $42.10.

We hope to carry this experiment on over a number of years, so as to be able to determine with a reasonable degree of accuracy the average annual profit from spraying. The Department is much indebted to Mr. Johnson for his interest in the work, his help in handling the crop for us, and in other ways.

Cost of Inspection Work.

During the past year a great deal of additional work of an experimental nature has been undertaken. The increased cost, however, has been largely balanced by the elimination of a certain amount of inspection work as explained elsewhere. An extra man was appointed on the Browntail inspection, and the services of another to take charge of the inspection work at Digby secured.

The total cost of inspectors' expenses and salary during the past year has been $6,936.00.

Much of the experimental work undertaken has now reached such a stage that an additional expenditure is required if it is to be continued. For this reason an increased appropriation for next season is essential.

Conclusion.

The report shows that several distinct lines of work are performed by this department. On this account there is no cessation of our activities throughout the entire year. This has the advantage of enabling us to keep our men continuously employed, a circumstance that makes for more efficient work, though at times our facilities are taxed to the utmost.

In order to systematize our work and to have always available, accurate accounts of the work being carried on, a system of permanent records has been devised, which we endeavor to keep constantly up to date. Our present quarters in the new Science Building are commodious and suitable in every respect for the present needs of the department. Our effectiveness as a department is thus greatly increased and we are enabled to accomplish tasks which we could not otherwise undertake.

In conclusion I desire to thank you, Sir, for your interest in the work of the department and in seeing that we were provided with the necessary funds by means of which much necessary work was accomplished.

Respectfully submitted,

WILLIAM H. BRITTAIN.

PART 4.—HORTICULTURAL DEPARTMENT.

To M. Cumming, B. A., B. S. A.,

Secretary for Agriculture,

Truro.

Following is my ninth Annual Report as Horticulturist—

The season of 1915 was cool and moist. The last spring frost occurred on June 2nd, but appeared to do no damage. The first falls frost came on September 26th, thus allowing a comparatively long growing season for tender crops. The year was favorable for cool-season crops such as onions, celery, root crops and strawberries, but not as favorable for tomatoes, cucumbers and corn.

Apple orchards in June gave promise of a full crop, but this was much reduced by the heavy drop which occurred in July. The yield for the Province this year is estimated at less than 700,000 barrels as compared with 973,222 barrels and 21,595 boxes in 1914. Owing to the wet weather black spot developed abundantly, especially in unsprayed orchards.

The Model Orchards.

No new model orchards were planted in 1915, the last one having been set at Stirling, Richmond County, in 1914, making a total of 35 now in the Province. These orchards continue to make good progress, some of the older ones having yielded 50 to 60 barrels of apples this year in spite of the unfavorable season. The small orchard at Wycocomagh, set in 1912, gave a yield of 4 bushels. In the Western Counties, including Hants, Lunenburg, Queens, Shelburne, Yarmouth and Digby, the varieties commonly grown in the Annapolis Valley grow well. Some of the kinds recommended for commercial purposes in these counties are Gravenstein, Blenheim, Ribston, King, Baldwin, Greening, Fallawater and Nonpareil. For the Eastern Counties, including Cape Breton, hardier varieties such as Crimson Beauty, Yellow Transparent, Duchess, Wealthy, Dudley, McIntosh Red and Milwaulkee, are recommended. These are mostly early kinds, but they are much more likely to succeed in the colder parts of the Province than later maturing varieties; although there are districts in Eastern Nova

Scotia where the winter apples succeed, such as, for instance, at Williamsdale in Cumberland County, New Annan in Colchester, and in parts of Pictou County. Besides, when early maturing varieties are grown in places with relatively short growing seasons the fruit is firmer and better keeping than when the same varieties are grown in localities with longer and warmer seasons.

The following table gives the blossom dates for a few leading varieties at eight different stations in the Province in 1915.

Variety.	Avondale	Boylston.	Bridgetown.	Great Village	Falkland Ridge	Pugwash	Wolfville	Aspen
Hurlbut	11-15 June	10-15 June	....	* -15 June	7-10 June	....	....	....
McIntosh	14-20 June	....	....	-12 June	5-8 June	....	....	13-18 June
Yellow Transpt.	7-12 June	....	....	-6 June	....	....	4-8 June	10-17 June
Golden Russet	11-17 June	20-26 June	31 May 5 June	-20 June	....	....	6-9 June	....
Ribston.	....	12-17 June	2-7 June	....	5-8 June	10-18 June	....	....
Ben Davis	....	20-26 June	....	-20 June	8-11 June	12-21 June	10-14 June	16-22 June
Wolf River	12-16 June	12-19 June	....	....	5-8 June	....	6-9 June	....
Duchess	7-12 June	10-15 June	....	-12 June	6-9 June	9-17 June	....	9-16 June
Spy	14-19 June	20-26 June	....	....	8-12 June	13-16 June	....	....
King	9-14 June	....	31 May 5 June	....	3-7 June	10-17 June	....	....
Baldwin	12-17 June	....	1-7 June	....	....	....	....	....
Stark	....	2-7 June	-15 June	5-9 June	....	6-10 June	....	....
Astrachan	....	28 May 3 June	-8 June	3-7 June	8-17 June	....	....	....
Gravenstein	....	29 May 3 June	....	2-6 June	....	2-6 June	....	....
Wagener	....	1-7 June	....	5-8 June	11-20 June	4-9 June	....	....

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* Date of full bloom only.

Not only does the time for blooming of a given variety vary for different parts of the Province, but there is often a difference of several days at the same station for the blooming of different varieties. For instance, the time from first to full bloom of the Gravenstein at Wolfville was June 2nd to 6th, and Ben Davis at the same place June 10th to 14th. The date of first bloom of Ben Davis at Boylston, Guysboro County, was June 20th. Thus there is sometimes a difference of a week or more in the blossom dates of different varieties at the same place and of ten days for the same variety at different places. For the purpose of interpollination it will thus be seen that varieties should be selected with approximately the same blossoming periods.

Complaint is sometimes made of fruit trees blossoming well year after year, but failing to set a crop of fruit. Instances of this kind have come to notice with apples, pears, plums and cherries. Occasionally when a variety of apple is isolated from other varieties and fails to set fruit, the failure is ascribed to lack of cross pollination. This explanation may, or may not, be the correct one. In any case, it is wise not to plant very large blocks of a single variety, nor to have in a large orchard more than four or five rows of one kind in succession. Where orchards have been planted with the different varieties widely separated from each other and do not produce satisfactory crops, it would be well to interplant with other varieties which blossom at the same time as the trees now set. Early bearing varieties which are also small growing trees, such as Duchess, Wealthy and Wagener, are good for this purpose. Or the owner might top graft some of the rows or some of the trees in the rows to other varieties suitable for cross pollination. When a person has only a few plum or cherry trees, and these blossom, but fail to set fruit, a few trees of another variety should be planted near-by for cross pollination.

The season in Eastern Nova Scotia is shorter than in the western part of the Province, as the table for the blossom dates shows. For this reason varieties of apples which require a comparatively long season in which to mature properly should not be planted in the Eastern Parts. Otherwise the size, color and flavor of the fruit are likely to be inferior.

Besides the work of the model orchards, work is being done by this Division in eight other orchards of the Province, as outlined in previous reports. These orchards, which were planted and brought to bearing age by the owners, are situated, one at each of the following places;—Barss' Corner and Bridgewater, Lunenburg County; Hectanooga, Yarmouth County, Annapolis and Bridgetown, Annapolis County; Williamsdale and Pugwash, Cumberland County; and Orangedale, Inverness County. By agreement with the owners the Horticultural Division is enabled to use these orchards for demonstration purposes. The aim is to show the effects of proper pruning, spraying, fertilizing, and cultivating in the growth and health of the trees and the yield of fruit. A test is also being made of the relative merits of phosphoric acid, potash and nitrogen as orchard fertilizers.

Last year a demonstration vegetable garden plot was planted in the model orchard at Glendale, Inverness County. The aim was to interest people in the growing of vegetables, to show what kinds can be grown and the method of culture. A greater variety of vegetables than most persons now have in their diet would no doubt be advantageous in several ways. The growing of such crops in a young orchard is often beneficial to the growth of the trees, because the cultivation and the fertilization of the land necessary for the development of the vegetables is the same as that required for the trees. The results at Glendale were encouraging. This year two more gardens were started, one at Orangedale, the other at Whycocomagh. The owner at Glendale having enlisted for service at the front, that garden was held over for another year.

Mr. McFarlane at Orangedale reports:—"My vegetable garden turned out well and was admired by all who saw it. On one-third of an acre I raised last summer 75 bushels of potatoes, 12 barrels of turnips, 2 barrels of beets, 3 barrels of carrots, 1 barrel of parsnips, 2 bushels of green tomatoes, 98 head of cabbage, some of which, after the outer leaves were removed, weighed 15 lbs. each, 100 bunches of celery and nearly a barrel of onions, besides beans and radishes enough for our own family use during the summer and autumn."

At the Agricultural College the usual vegetable plots and flower borders have been grown and used for demonstration purposes with students and visitors. The low area between the Dairy and the Horticultural Buildings, having been filled in with grading material from the site of the new Science Building, is now being prepared for a model kitchen garden. The greenhouse adjoining the Horticultural Building is used for plants for class room demonstration, the horticultural section of the new greenhouse, for experimental purposes.

At Plumdell, three quarters of a mile east of the Agricultural College, the five-acre apple orchard planted in 1914 has made satisfactory growth. The variety which has made the largest growth is Milwaukee, the poorest, Fameuse. In this orchard an experiment is under way to test the relative merits of basic slag, acid phosphate and bone meal as sources of phosphoric acid for cover crops. Plots have also been treated with ground limestone, marl and muriate of potash to note what effect, if any, these materials have on the growth of cover crops. A three year rotation of rye, clover and potatoes is being carried on in this orchard, keeping the grain and clover sod far enough away from the rows to allow of proper cultivation of the trees.

Small Fruits.

In a plot of one and one-half acres tests are being made of twenty different kinds of strawberries including those commonly grown in this Province and a few English varieties, such as Royal Sovereign, Scarlet Queen, Fillbasket, and Sir Joseph Paxton. A bush fruit plot of one acre was planted in the spring of 1915. A number of the most promising varieties of currents, gooseberries, raspberries and blackberries have been set out with a view to testing them and propagating from the best kinds.

Nursery.

The nursery plot of one acre contains apples, pears, plums and cherries, bush fruits and a number of hardy mental shrubs, such as spiraeas, barberries, snowballs, lilacs and roses. The propagation of this stock is effected chiefly by means of budding, grafting, and by cuttings. Greenwood cuttings of some of these shrubs were successfully rooted in cold frames in August. Hardwood cuttings, that is cuttings of the ripened wood, of gooseberries, currants, and ornamental shrubs, have been taken this fall to be planted out in a well prepared bed in the spring. Gooseberry bushes, roses and other shrubs have been potted for use in making greenwood cuttings during the winter.

Vegetable Seed.

In 1914 a small quantity of beet and parsnip seed of good quality matured. In 1915 either due to the late planting out of the roots or to an unfavorable season, the seeds of parsnips, carrots and beets failed to develop. But a plot of one-fifth acre of seed turnips matured well, producing 220 lbs. of good seed.

Tomatoes.

For the past three years sowings of tomatoes were made at different dates in the spring to determine the best time to start this crop in the vicinity of Truro. This year sowings were made on 8th, 15th, 22nd, and 29th March, and 5th, 12th and 19th April. It would seem from the results obtained up to the present that the best time to start the main crop here, for market is in the early part of April between the 5th and the 19th. In the western part of the Province an earlier date than this would be advisable.

Tests with plants carried on after the first transplanting in pots and flats showed better results in yields for those grown in flats. Plants trained to stakes in the field yielded less both of green and ripe fruit than the unstaked. Plants having the terminal shoots removed by pinching out when the plants had made six good leaves gave smaller yields than the unpinched plants. Twice transplanting in the flats and once outside (i. e. three transplantings altogether) gave better results in yields both of green and ripe fruit than one transplanting in the flats.

Demonstration Vegetable Plot at Plumdell.

Six varieties of asparagus and six of rhubarb were planted in the spring of 1915 in plots of one-eighth acre each. The demonstration plot of vegetables contained Jerusalem artichokes, horse-radish, seakale, salsify, leeks, spinach' and the sweet herbs, besides many of the more common vegetables. The object of this plot is not only to illustrate the different kinds of vegetables which can be grown here, but to show how they may be grown so as to be of the best quality.

Fertilizer Tests With Carrots and Parsnips.

One half of the land which was used for fertilizer tests with potatoes in 1914 was sown to carrots and parsnips this year. The other half was planted with cabbage. The same plots were retained and fertilized as they had been for potatoes the year before. Plots adjacent to these were given an application of well rotted manure at the rate of 12 tons per acre and were sown with carrots or parsnips, or planted with cabbage for comparison with the fertilized plots.

Table II showing the yields of the Manured, fertilized and limed plots.

Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7
Rotted manure 12-14 tons per acre.	Check	Acid Phos. 800: lbs. per acre. Potash 200 lbs. per acre.	Nitrate Soda 200 lbs. per acre. Potash 200 lbs. per acre.	Nitrate Soda 200 lbs. per acre. Acid Phos. 800: lbs. per acre.	Nitrate Soda 200 lbs. per acre. Acid Phos. 800: lbs. per acre. Potash 200 lbs. per acre.	Limed in 1914 4 tons per acre.
Carrots. 762 lbs.	540 lbs	669 lbs	513 lbs.	544 lbs.	701 lbs.	593 lbs.
Parsnips. 459½ lbs.	313 lbs.	409 lbs.	346 lbs.	372 lbs.	373 lbs.	407 lbs.

The manured plots produced the largest yields both of carrots and parsnips. But the roots were rougher and more forky than in the fertilized plots or the check plots. For a crop of smooth roots of good quality, of course, the manure should be applied a year ahead and well worked into the soil. The plot containing the three elements, nitrogen, potash, and phosphoric acid, produced the next largest yields of carrots and the plot with acid phosphate and potash the third largest yield. The limed plot stood fourth. With parsnips, however, the limed plot stood next to the manured plot. These limed plots had no manure or fertilizer either in 1914 or 1915 and produced a smaller yield of potatoes in 1914 than the check plot.

On account of an outbreak of clubroot the cabbage crop failed completely. Next year a test will be made of different methods of eradicating the disease.

Potatoes.

In 1914 the yield of the unlimed potato plot exceeded that of the limed plot, the yields being at the rate of 245 and 225 bushels per acre for the two plots respectively.

In 1915 a strip containing 8 plots, each 32 feet square, was given an application of nitrate of soda at the rate of 250 lbs. per acre and acid phosphate at the rate of 800 lbs. per acre. The 1st, 4th, 7th, and 8th plots were check plots, nothing else being applied to them. The 2nd plot had ground limestone at the rate of 4 tons per acre, the 3rd plot muriate of potash, 300 lbs. per acre, the 5th plot, marl, 4 tons per acre, the 6th plot, muriate of potash, 300 lbs. per acre. The eight plots were planted with Irish Cobbler potatoes.

The yields were as follows:—

I	II	III	IV	V	VI	VII	VIII
1st check	Lime	Potash	2nd check	Marl	Potash	3rd check	4th check
374.1 lbs	313.5	378.7	328 lbs.	402.5 lbs	460.6 lbs	456.3 lbs.	385.6 lbs

While several factors may have combined to produce these results, it will be noticed that here again the freshly limed plot gave a smaller yield than the unlimed plot. The Rhode Island Experiment Station classes the potato among a large number of crops which are tolerant of a moderate degree of soil acidity. The addition of lime to some soils for such crops may result in only a small increase or even a decrease in yield.

Besides my work in horticulture I have had the teaching of economics to the agricultural students and nature study to the rural science classes. Both of these lines of work call for a considerable amount of time and effort. Under economics the essential factors in the production of wealth are studied, viz;—land, labor, and capital; the difference between land and capital from an economic point of view; the growth of modern capitalism and the consequent changes in industrial and farm life; socialism; taxation for revenue and for equalizing opportunities; the nature and functions of money and its relation to prices; co-operation, co-partnership and profit sharing.

Acknowledgements.

Credit is due Mr. James Allan, the Assistant in Horticulture, for the thorough manner in which he has carried on his work in connection with this division both at the College and at Plumdell Farm.

Mr. J. R. Dickson in addition to his other duties has efficiently managed the greenhouses and college garden. Mr. John Webb has continued as satisfactory foreman at Plumdell Farm.

During the summer months Mr. Carl M. Dickey, a graduate of this institution, assisted in the inspection of the model and demonstration orchards.

Respectfully submitted,

P. J. SHAW.

PART 5—REPORT OF THE PROFESSOR OF AGRICULTURE AND FARM SUPERINTENDENT.

Principal M. Cumming,
Secretary for Agriculture.

Sir:—I have the honor to submit herewith the Annual Report of the Nova Scotia Agricultural College farm for the year 1915.

No change was made during the year in the foremen who have charge of the work on the farm and in the barns. Mr. Thomas Hooper continued his very efficient work as Farm Foreman and Manager of the Horse Barn and Mr. William Retson has again demonstrated his ability to properly feed and manage the cattle and swine.

The work of the year in general has been fairly satisfactory. The spring was rather late and the root crops were not planted as early as last year. This in connection with rather too much rain gave us a lighter crop of turnips than usual.

The hay crop was good. It was difficult to harvest on account of the heavy yield and a good deal of rainy weather. Practically all the hay was secured in good condition however. Grain grew well and gave heavy crops of straw, but the heads were not as well filled as last year.

The health of animals on the farm has been excellent. The Bang System of isolating cattle that have reacted to the tuberculin test is still in force. The number of reactors is constantly decreasing and the number of non-reactors rapidly increasing.

CROP REPORT.

Oats.

Oats were grown on land devoted to corn and roots the year before. The corn land was plowed in the fall of 1914. It was thoroughly harrowed in the spring and seeded with different varieties of oats on May 8th and 10th. Where roots were grown in 1914 the land was not plowed in preparing it for seeding with oats. This particular piece of 9 acres was very free from weeds and was easily worked up into an excellent seed bed in the spring by stirring it with the stiff-toothed cultivator. This cultivator, or digger is drawn by three horses and loosens the soil without turning it over. This method of cultivation left the fine clean soil of the turnip field on top and made an ideal seed bed for the reception of oats and grass seed.

Seeding began earlier than in 1914, but was not finished until later. We had a dry spell of weather the third week of April which enabled us to get wheat and oats sowed that week. Early in May we had rainy weather and some of the grain and the root crops were not put in until late. The date of first seeding of oats for the past three years is shown in the following table.

	Date of first seeding of oats	Soil Temperature at depth of 3 inches
1913	April 20th	52 deg. F
1914	May 13th	45 " F
1915	April 29th	39 " F
	Date of seeding wheat.	
1915	April 22nd	36 " F

The oats used for seed were all treated with formalin to destroy smut spores. One pint of formalin was added to 30 gallons of water and the bags of oats were soaked in this solution for 20 minutes. They were then emptied out on a clean floor in a warm room and kept stirred with a rake until dry. When gathered up again they were returned to the same bags in which they had been treated in order to prevent re-infection with spores of smut. This treatment has proved perfectly satisfactory as no smut has appeared in our oat fields the past two years.

The following varieties were sown on the field where corn was grown the year before. This land was not in as good condition as the field where the variety tests were made the previous year, and this together with the unfavorable season accounts for the decrease in yield as compared with last year.

Variety	Size of Plot	Pounds of Straw and Grain per Acre	Yield of Grain per Acre	Per cent of Hull
*Banner (Waugh Strain)...	1 acre	4800	58.5 bus	27.0
Banner (Brown Strain)...	1 "	4570	50.3 "	26.8
Ligowo	1 "	4530	48.5 "	25.5
Sandy.............	½ "	4900	63.0 "	24.0
Gold Rain..........	½ "	4720	53.0 "	23.5
*Kemp............	1 "	3850	40.0 "	26.1
*Early Blossom.....	½ "	4940	47.0 "	29.5

It will be noted from the above figures that the heaviest yield was obtained from an oat we did not grow last year, namely the Sandy. The next best yield was from Waugh Strain of Banner that we have been raising for a number of years.

*Badly lodged.

The main crop of oats grown on the upland was the nine acres on last year's turnip land. This was seeded with carefully selected Banner oats and looked exceptionally well in the field. They were housed in excellent condition but have not yet been threshed so that the yield cannot be given. Cutting oats began on Sept. 4th and was finished on the 7th.

Marsh oats were sown quite late. The marsh had been plowed in the fall but cold rains through the early part of May delayed seeding, and it was not finished until May the 24th. The first piece put in on the marsh was on May 18th. This land was given a dressing of 5oo lbs. of Sydney Basic Slag per acre before sowing the oats. It was all seeded with grass and clover at the rate of 5 lbs. timothy, 5 lbs. Alsike and 3½ lbs. of red clover per acre. The seeding grew well and when the oats were cut the stand of clover was all that could be desired. About 25 acres were thus seeded. The oats were housed in good condition but have not all been threshed and the yield per acre cannot be given.

Wheat.

Two plots of ½ acre each were sown to wheat on last year's turnip land. The varieties tested were White

Russian and Red Fife from carefully selected Nova Scotia grown seed. The soil was prepared by stirring with the stiff tooth cultivator the same as for oats. The seed was put in on April 29th. It grew well, was free from weeds and made a fine looking piece of wheat. It was cut on September 6th. The yield was not as large as one would expect from the appearance of the standing crop. A good many heads were affected with loose smut and that no doubt lowered the yield to some extent. The seed used in this field was treated with formalin, but unfortunately this treatment does not kill the loose smut. It kills bunt or "stinking smut" and none of this latter form appeared.

The Red Fife yielded at the rate of 20 bushels per acre and the White Russian 21.6.

A second piece of wheat was sown on spring plowed land and seeded with commercial seed. The results on this piece were quite unsatisfactory. One acre seeded to Marquis failed to grow at all on account of extremely poor power of germination in the seed. Other pieces contained a mixture of other grains and altogether the attempt to get a crop of wheat by plowing up land in the spring and using whatever seed was available was not a success.

The rather sandy soil of the College Farm has always been unsatisfactory for wheat, all previous attempts to raise this grain having met with very indifferent results.

The four and one fifth acres upon which this commercial wheat was grown, leaving out the acre that failed to germinate, gave a total yield of 63.7 bushels. The results of this work illustrates very clearly the imperative need for good seed and careful soil preparation.

Seeding for Hay Crop.

Timothy and clover seed were sown with oats on the upland and on the marsh, and with the wheat. The seed used on the upland was 10 lbs. timothy, and 10 lbs. of medium red clover per acre. This is rather heavier seeding than usual but we think it pays to use a liberal amount of good seed. We did not use alsike on the upland as it is not particularly suited to our light soil, and where the land is only in grass two years we do not need the perennial Alsike as much as we do on the marsh where hay is cut for five or six years in succession.

On the marsh the seed consisted of 5 lbs. timothy 3½ lbs. medium Red Clover and 5 lbs. of Alsike. All the new seeding made a good start and was in excellent condition for winter on Dec. 1st.

Mixed Grain.

Two ½ acre plots of mixed grain were sown, one of oats, barley and peas and one of oats, wheat and peas.

The first mixture yielded 42 bushels per acre and the second 45. This yield is not high, only about half that secured last year, but the mixed grain made excellent feed for the cows when put through the crusher.

Mangels.

Three varieties of mangels were grown on 3 acres, one acre of each variety. This land grew oats in 1914, was ploughed in the fall and given a dressing during the winter of 25 loads of manure per acre. When the land was prepared in rows for the mangel seed 1000 lbs. of Sydney Basic Slag was applied per acre. The seed was sown on June 2nd. The following table gives complete information concerning this crop.

Plot	Variety	Fertilizer used	Yield per acre. (50 lbs. per bus.)
No. 1	Suttons Prize Winner	Sydney Basic Slag 1000 lbs.	592 bus
No. 2	Suttons up to Date	1000 lbs. S. B. Slag ½ acre 2 tons marl 325 ½ " no " 266	591 bus
No. 3	Golden Tankard	1000 lbs. S. B. Slag	434 bus

The Golden Tankard is a fine small topped variety and did not make as strong growth as the others.

It will be noted that half of plot No. 2 was treated with marl at the rate of 4 tons per acre and that this treatment gave an increase at the rate of 118 bushels per acre. The marl used was almost pure calcium carbonate, the same material as limestone rock.

Turnips.

Turnips were raised where oats, or oats peas and vetch, had been grown the year before. The land was plowed in the fall and manured at the rate of 15 tons per acre during the winter and spring. A large part of this field of 19 acres was not in "good heart," as it was naturally poor land and has not been in cultivation long enough to be evenly supplied with plant food. For this reason, together with the fact that the wet weather in May prevented early seeding, the crop of turnips was rather lighter than usual.

The following table shows varieties grown, fertilizer used and yield per acre.

Size of Plot	Variety	*Fertilizer Used	Yield per acre Bushels
No. 1-1 acre	Suttons Champion	1000 lbs Acid Phosphate	724
No. 2-1 "	" "	1000 " Ground Rock Phos	904
No. 3-1 "	" "	1000 " Sydney Slag	822
No. 4-1 "	" "	1000 " Acid Phosphate	716
No. 5-1 "	" "	1000 " Sydney Slag	601
No. 6-1 "	" "	840 " Filter Mud	435
No. 7-1 "	Magnum Bonum	1000 " Acid Phosphate	
		½ " ground limestone 415	
		½ " marl 398	813
No. 8-1 "	Corning	1000 " Acid Phosphate	
		½ " ground limestone 406	
		½ " no " 396	802

It will be noted that some of the plots gave very light yields. In the case of plot No. 6 where a phosphoric fertilizer obtained from the sugar refinery called "Filter Mud" was used, the low yield is partly accounted for by late seeding. On this plot the first seeding was plowed up on account of the weeds getting such a start of the turnip plants that it was not worth while to try to save them. This happened because cold rains came at just the time the turnips should have been weeded. Plowing up the whole acre and reseeding made the crop late and is at least partly responsible for the very low yield. The same treatment was given half of plot No. 5 and no doubt accounts for the 115 bushels that it is below No. 4. The date of seeding for the first 4 plots was June 8th, and the plants were showing above ground on the 13th. Plots 5 and 6 were seeded on June 9th, but were plowed up later and reseeded. The remainder of the plots were not seeded until June 15th. The addition of ground lime stone to half of plot No. 8 only increased the yield 10 bushels, or at the rate of 20 bushels per acre. The ground rock phosphate or "floats" used on plot No. 2 although it furnished insoluble phosphoric acid, contained almost twice as much of that constituent as the slag or acid phosphate. The long period of growth in turnips doubtless enabled the phosphoric acid to gradually become available, and thus gave a better yield.

*50 lbs. per Bushel.

Turnip Seed.

One half acre was devoted to turnips planted for seed. The turnips were selected in the field the previous fall from the "Suttons Champion" variety. Medium sized roots of the typical shape for this variety were taken. These were kept in a cool cellar and set out in a rich mellow piece of land on May 14th and 15th. The Suttons Champions were set in rows 3 feet apart and placed two feet apart in the row. We decided later that it would have been better to have spaced the rows in a different manner, on account of the difficulty of cultivating and harvesting. Next year we plan to place two rows 2 feet apart and then leave about a 4 foot space and then two more rows 2 feet apart. The two rows will soon grow solid together, but we will be able to get through the wide spaces for cultivation and harvesting.

The land where the seed was grown received a dressing of 20 loads of manure per acre, and in addition 150 lbs. of Ammonium Sulphate and 400 lbs. Sydney Basic Slag. The seed stalks started strongly and soon made a dense growth all over the field. Wherever the weeds made any headway after the plants were too large to cultivate, the amount and quality of the seed was reduced.

The stalks were cut from Aug. 20th to Sept. 7th. Each stalk was shaken over a canvass to knock out all ripe seed. It was then placed on a rack in a shed to dry and later the seed was beaten out on a canvass and collected. A good deal of seed was lost and the yield of clean seed only amounted to 240 lbs. for the half acre.

In addition to the seed raised on the farm the Horticultural Department of the College grew about half an acre of seed from Corning variety. The seed from both lots will be sold by the Farm Department.

From our experience of this year I would hesitate to advise farmers to attempt to grow any large amount of turnip seed. Every farmer can easily grow enough for his own use, but the difficulty of harvesting and curing half an acre or more is quite serious.

White, or Soft Turnips.

Several acres of Soft Turnips were grown as usual. The returns per acre were excellent. These turnips furnish a large amount of very palatable food, just at the time of the year when it is most needed. In October when the grass stops growing in the pastures, and the nights are cold, and the cattle begin to look for some other feed, the white turnips can be pulled easily and given to them tops and all.

Last October and November we hauled as high as 40 tons per acre of these turnips to the cows. Once in October and once in November we measured off 4 square rods and pulled the turnips and weighed them. In both cases they weighed exactly 1980 lbs. or almost 1 ton per 4 sq. rods or 40 tons per acre.

The variety that gave us the best results this year was Suttons Early Sheepfold.

Rape.

In addition to the White Turnips we grew 1½ acres of rape. The variety sown was the New Cabbage Leaf. This variety and the Dwarf Essex both give good yields. We find that rape must be grown on good soil well fertilized in order to give a good crop. On poor soil it grows slowly and the stalks are hard, not succulent and tender. On rich soil it grows rapidly and will furnish as much as 30 tons per acre of very succulent nutritious feed. It is especially valuable for young cattle and pigs. Cattle under 1 year old will not eat the soft turnips unless they are sliced, but they readily eat and relish the rape.

Rape is grown in the same way as turnips, seeding at the rate of 2 pounds per acre. Very little thinning is necessary since the rape does not form a fleshy root like the turnip. It should be kept well weeded and cultivated. It can be fed off with pigs, or sheep, or cattle in September and will grow up again and may be pastured later. Or it may be cut and fed in the barn or feeding lot in the same way as the soft turnip.

Soiling Crops.

Oats, peas and vetch were sown in April to furnish green feed to cut for cows, calves, bulls and pigs during the summer.

This was sown rather thicker than usual and gave a good crop ready to cut by the middle of July. Successive sowings were made from the last of April to the 1st. of June, and these plots came on in order as they were needed. They were seeded with 2½ bushels oats, .¾bus. peas, and .⅓ bus. of vetch per acre.

Silage Crops.

Corn was planted on 5.7 acres. The varieties used were Compton's Early, Duke's White Cap Dent, and Canada Yellow. The season was not favorable for its growth and the yield secured was not large. The corn formed ears, however, and was nearer ripe when cut than that grown the year before. The yield of Compton's Early was 8 tons per acre, and of White Cap Dent 9.5 tons. The yield of Canadian Yellow was low, not more than 5 tons per acre.

The land on which the corn was grown grew timothy hay the year before. Soon after the hay was cut the land was plowed, and it was seeded in September with winter rye. The rye started early the next spring and by the third week in May had made a good growth. It was top dressed during the winter with a light dressing of stable manure. It was plowed down the last of May, the land well tilled with the disk harrow and the corn planted on June 1st. and 4th. This method of adding humus to the soil gave us a very fair crop of corn from a very light piece of land. Plowing down the rye loosened up the soil and made it warm up more quickly than if plowed in the fall or than if no green crop had been plowed down. The corn was planted on June 1st, cut and shocked on October 1st and put through the ensilage cutter into the silo on Oct. 5th and 7th.

Oats, Peas and Vetch.

(*O. P. V. Silage*).

In 1914 we raised 65 tons of this mixture from 5.7 acres. This year we raised 29 tons on 3 acres. The crop was not quite as heavy as the year before on account of part of the field being too low and wet for this rainy season. On the drier parts of the field, however, the mixture grew well and most of the 29 tons grew on 2 acres. It was sown on May 13th and cut with the ordinary mowing machine and run through the ensilage cutter into the silo on Aug. 25th and 26th.

This mixture which we call the O. P. V. Silage mixture is much relished by the cows and is much easier to raise and a surer crop than corn. Both years we have raised it, the O. P. V. mixture has given us more dry matter per acre than our corn crop, and has been secured with less than half the cost for labor.

In order to get a large yield it must be sowed on good land, and only large crops are worth raising. It is quite possible with good land well prepared to get from 10 to 15 tons of green material per acre.

Alfalfa.

The piece of Alfalfa described in my report for last year came through the winter in excellent condition. It was seeded on clean land in July 1914 without any nurse crop. It grew well that summer and was eighteen inches high when winter set in. No cutting was done the first fall and the luxuriant growth made an excellent covering for the field for winter. It came through the winter well and started growing early in the spring. The first cutting was made on July 7th, and yielded at the rate of 2 tons per acre. A second cutting was made on Sept. 2nd and gave 1 ton per acre. Although the yield was quite satisfactory it was a much lighter crop than was secured from one cutting of medium red clover and timothy.

This piece of alfalfa is the first one we have grown on the farm that has proved anything like successful in a practical way. Our experience this year, however, in trying to start a second piece shows how difficult it is to get a good stand.

The same method was followed as in 1914. Grim Alfalfa seed was used, obtained from Suffield, Alberta. The land was summer fallowed until July 20th. On account of the wet season, however, the weeds were not all killed, and when the Alfalfa started they started with it and eventually killed it out almost entirely.

Seeding Alfalfa with a nurse crop in the spring in the same way we seed clover has not proved to be successful with us. It seems necessary to state therefore that the time has not yet arrived for the farmer to try to raise any quantity of this crop, but all work with Alfalfa must continue to be done in small plots in an experimental way.

Hay.

The hay crop this year was excellent both on the upland and on the marsh. Haying began on July 13th. The results of applying ground lime stone to the new seeding with wheat and oats the spring of 1914 was very apparent in the clover crop this year. I acre sown to oats in 1914 and half the plot treated with 2 tons of ground lime stone gave the following amount of clover hay:—

Half acre not limed..............	2550 lbs. of cured hay.
Half acre limed..................	3610 lbs. of cured hay.

A half acre plot sown with wheat in 1914 and one ton of ground lime stone applied to half the plot gave the following results.

One quarter acre not limed ....1150 lbs. of cured hay.
One quarter acre limed ....2010 lbs. of cured hay.

On two other plots the difference was not so marked, amounting only to about one half a ton more per acre for the limed sections. A full report of the yields of hay on limed and unlimed plots is given elsewhere in this report, under the heading, "Use of Ground Limestone."

The ten acre field reported as producing 28 tons of hay last year gave 38 tons this year, or an average of 3.8 tons per acre.

On the marsh the new seeding was very heavy. Everywhere clover was luxuriant, having come through the winter in perfect condition. It will be remembered that clover the winter before was universally killed out, and as a result practically none was found in our hay fields the summer of 1914. Last year was such a favorable season, however, that heavy yields of clover were secured in many places where none had been sown for years. This was especially true of Alsike.

Owing to the continued wet cool weather throughout the latter part of August, heavy second growth cuttings of clover were secured, in some cases the yield being fully 2 tons of hay per acre. This on the limed plots together with the first cutting of nearly 4 tons, gave a very heavy yield forthe season. This amount, nearly 6 tons of hay per acre is much more than we have ever been able to secure from Alfalfa.

Fertilizers

The fertilizers used and the results obtained have been reported under the different crops. Our purchases were practically confined to various forms of phosphoric acid. The experiments on turnips were far from satisfactory on account of the impossibility of getting the seed all in the ground at the same time. The results on the plots 4 to 7 inclusive, however, are fairly comparable and here it will be noted that the ground phosphate rock gave the best results.

It will also be noted that where lime was used with acid phosphate better results were obtained than where lime was omitted. Sydney Slag gave good returns as usual. On the marsh the results from its use were highly satisfactory.

Use of Ground Limestone.

Experiments in the use of ground lime stone were started at the Nova Scotia Agricultural College the spring of 1914. Three plots of oats and three plots of wheat were treated with the lime stone at the rate of 4 tons per acre. The lime stone was distributed with a fertilizer sower over half of each plot before the wheat and oats were sown, and mixed with the soil by harrowing. The grain was put in with a regular grain drill, and timothy and clover seed sown at the same time.

No material difference was noticed in the yield of grain on the limed and unlimed parts of the plots. As soon as the grain was cut, however, the clover on the limed portions of most of the plots was found to be considerably ahead of that where no lime had been used. This difference became more noticeable as the fall advanced, and continued as soon as growth started in the spring of 1915. On two of the plots very little difference existed between the limed and unlimed portions. These plots were rich and in excellent condition for growing clover and a heavy crop was obtained whether lime was used or not. This agrees with our previous observations that lime does best on soils of medium richness. On poor soils there is not enough humus and plant food present to grow a big crop and lime does not furnish the necessary food, therefore, the results are poor. On rich land, however, conditions are often so good that big crops of clover are obtained even without the application of lime.

The following table shows the size of plots and yields obtained. It should be noted that these plots are larger than many experimental plots and represent actual field condition:—

No. of plot	Size		Amount of cured hay	Yield per acre
1	1 Acre	(½ unlimed	2550 lbs	2.5 tons
		(½ limed	3610 "	3.6 "
2	1 "	(½ unlimed	2570 "	2.6 "
		(½ limed	3090 "	3.2 "
3	½ "	(½ unlimed	1160 "	2.3 "
		(½ limed	1490 "	3.0 "
4	½ "	(½ unlimed	1150 "	2.3 "
		(½ limed	2010 "	4.0 "
5	½ "	(½ unlimed	3650 "	3.6 "
		(½ limed		
6	½ "	(½ unlimed	3050 "	3.1 "
		(½ limed		

It will be seen from the above table that the gain from the use of lime stone was not uniform. On plot No. 1 the increase in favor of limestone was a little over one ton per acre, while on plot 2 it was only a little over half a ton per acre. On plot 3 the difference was 1320 lbs., while on plot 4 it was nearly one and three quarter tons. On plots 5 and 6 the yield was practically the same on both sides of the plots. The only explanation we can offer for the lack of results on the last two plots is that the soil was in such good condition that it grew clover well even without the use of lime.

The total yield in favor of lime on the two acres amounted to 1.4 tons. This at $10.00 per ton is worth $13.85. The amount of lime applied to the two acres was 8 tons. The returns from liming even in the past season were not confined to the one cutting of clover. The second growth was very luxuriant and the difference in favor of the limed parts was about 0.8 tons per acre. The total increase for the year was therefore 2.2 tons. It will be interesting to note the results of this experiment on the second years hay crop in 1916.

If the greatest difference in yield shown by any plot was taken as the basis for calculation we would find on plot No. 4 a gain of 1 ton 1440 lbs., worth at $10.00 per ton

Rosaline Royal, No. 26839. A 4 year old Clydesdale Mare—Sire Royal Baron by Baron's Pride Dam—Barbara. Owned and bred by College Farm, Truro.

Lillian Allerton, a Mare of Standard Breeding. A Favorite Driver at the College.

$17.20. This is the result of the application of 4 tons of lime stone would look like a profitable investment especially when future crops are considered. This method of figuring would not be fair, however, and illustrates clearly the need of duplicating experiments.

The results also show clearly the need for each man to test his own soil and it would seem like a wise undertaking for every farmer interested to treat at least one acre, and to use enough lime stone to be sure of his results.

It is claimed by experts on plant diseases that lime will kill out the club root of turnips and cabbages. Our crop of turnips this year was reduced to some extent by this disease. On that account we are applying five tons of ground limestone per acre this fall to the field where turnips will be grown next year. If thorough liming will rid Nova Scotia farms of club root it will be of great value to our farmers.

Further experiments with lime on oats and new seeding were started this year. The effect upon the oats was small, corresponding with results obtained last year but we will look for the effect on the clover next year with great interest.

Live Stock.

The live stock on the farm at the present time consists of 25 horses, 102 cattle and 24 swine.

Horses.

Lord Ullin the clydesdale stallion described last year was used again this season. He was 5 years old last May and was imported from Scotland in 1913. His sire was Sir Hugo (10924) by Sir Everard (5653) Dam Diana's Pride (15096) By Barons Pride (9122). Lord Ullin has been in good working condition all through the year and was bred to 74 mares.

The young clydesdale stallion Flash Royal was sold in the spring. The two year old Royal Thomas reported last year developed into a good 3 year old and was bred to 25 mares during this season.

The old thoroughbred Lucifer 2nd. became too old to be kept in good condition and was killed.

The standard bred stallion Achille is still in good condition and was bred to 15 mares, and Cliffe Rosador the Hackney was bred to 12 mares.

The one year old stallion colt College Baron is doing well and gives promise of developing into a useful stallion. The two year old stallion College Regent did not develop into a horse of good confirmation and he was therefore castrated early last spring. He is growing well and will make a useful farm horse.

The remaining pure bred clydesdales on the farm are three imported clydesdale mares and 4 home bred. The yearling clyde filly out of College Belle has developed into a fine large colt and is doing exceptionally well. In addition to the above, four pure bred colts were dropped in the spring. One of these proved worthless and had to be killed on account of defective stifle joints, and another one was born 10 days prematurely, was badly ruptured and soon died. The remaining two are doing well. One was from Barbara, and the other from Miss Time.

The pure bred mare Barbara was taken with a severe attack of pneumonia in November and died.

The remaining horses on the farm are:—

1 standard bred mare "Lillian Allerton."
1 Hackney mare, "Queen Louise."
1 " Gelding, "Rosador Performer."
1 cross bred mare, and foal by Cliffe Rosador.
6 grade work horses.

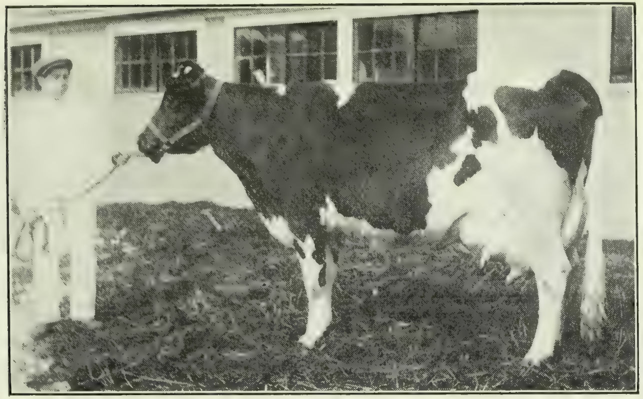
Cattle.

The Bang system of handling cattle that have reacted to the tuberculin test is still in use. The number of cattle left in the quarantine barn at the present writing (Jan. 1916) is twenty-four.

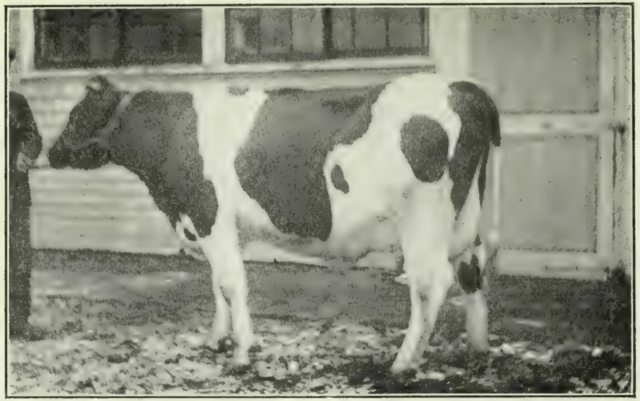
Among the cattle in the non-reacting barn only two cases have been found suspicious during the past year. All others tested have failed to react. This includes a number of young cattle that were born from reacting cows, but removed immediately after birth to the healthy herd. All indications point towards a speedy clearing out of reactors from the entire herd.

The following is a brief description of the cattle on the farm at the present time (Jan. 1st, 1916).

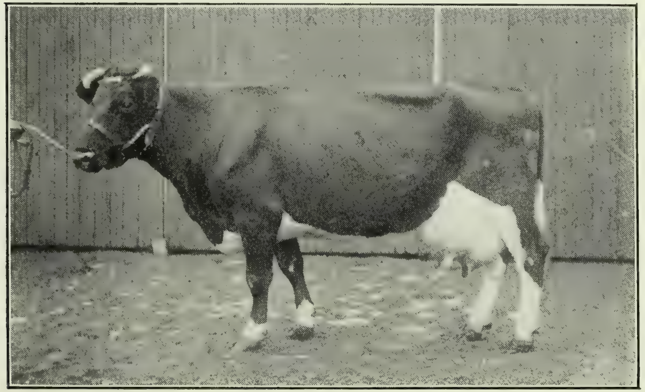
Total number 102, non-reactors 78, reactors 24.



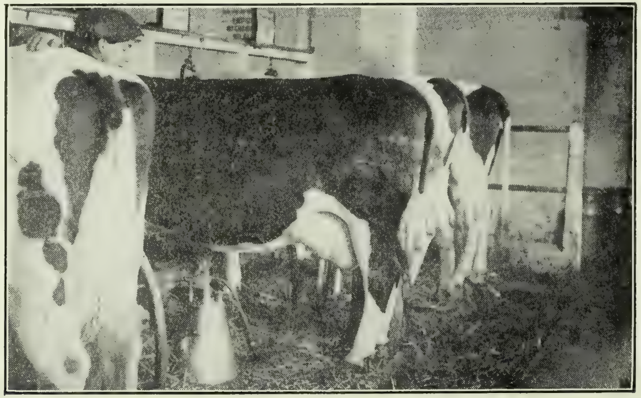
Emma of Evergreen 2nd, No. 10645. 1 year's record 16,737.6 lbs. Milk, 654.03 lbs. Butter. Owned by College Farm, Truro.



Flora Wayne Posch, a daughter of Flora Rooker Posch, who was a daughter of Flora Wayne of Riverside. The third generation at the College Farm.



Artis Rosie, No. 9808. 1 year's record Milk 16 737.6 lbs. Butter 752.25 lbs. Owned by College Farm, Truro.



Milking Machine at work in the College barn, Truro.

Holsteins—Number 39.

No Holsteins females were bought or sold during the year except a few females that were sold to be slaughtered. A number of young bulls were sold, and one 3 year old bull was bought and placed at the head of the herd. His name is Colony Canary Rag Apple No. 14038. He was born Feb. 5th, 1912. His sire was Rag Apple Korndyke 7th. who stands at the head of the herd owned by J. M. Steves, Steveston, B. C. This herd is recognized as one of the best breeding herds in America. Rag Apple Korndyke 7th. is a comparatively young bull, but has five tested daughters in the Record of merit list. He is more than a half brother of the famous bull Rag Apple Korndyke 8th. bred by E. H. Dollar, Henvelton, N. Y., and a grandson of the great bull Pontiac Korndyke.

The dam of Colony Canary Rag Apple is Wadmantje Canary, No. 17736 a cow owned by the Colony Farm Coquitlam, B. C. She is a great cow and has made big records in three successive years, giving as a junior three year old 24 lbs. of butter in seven days, and 99 lbs. in 30 days. As a junior 4 year old she gave 644.6 lbs. of milk in seven days and made 31.38 lbs. of butter. In 30 days she gave 2755.4 lbs. of milk and 122.70 lbs. of butter. As a mature cow 5 years old she gave 552 lbs. of milk in 7 days and 33.00 lbs. of butter. This is an extra good showing for three successive years. This cow has exceptionally fine qualities showing dairy temperament and conformation in every line of her make up. Her sire was Sir Canary Mechthilde one of the most famous bulls in Canada. He has 24 daughters in the Record of Merit list and their average production is exceptionally high.

We were fortunate in securing a son of this cow from such a well bred sire to place at the head of the college herd. Not only is his breeding of the very best but he himself is an outstanding winner in the show ring. He has every point that goes to make up a first class show animal.

The remainder of the Holstein herd is made up of 8 young bulls, 18 cows and 12 heifers.

Ayrshires—number 39.

No Ayrshire females were bought or sold during the year, except a few sold to be slaughtered. No bulls were bought but a number of young bulls were sold for breeding purposes.

The bull at the head of the herd is Gardrum Jim the same animal reported as herd bull last year. He was berd by George Retson of Ayrshire, Scotland, and is sired by one of the best bred bulls for milk production in that country. His dam is one of the cows in the college herd. She was imported by Retson Bros, Truro and has developed into a fine cow. She is making a better record this year than ever before, having given since freshening on May 15th, in five and a half months 8,042 pounds of milk. She is a handsome cow, and shows excellent quality and fine dairy conformation.

The remainder of the herd is made up of 7 young bulls, 17 cows, and 14 heifers, and 1 grade Ayrshire heifer.

Shorthorns—number 24.

The herd bull is Golden Ben, No. 95838 a yearling bred by Wm. Dryden, Brooklyn, Ont. The bull reported as the herd bull last year, Brilliant Morning, died in March. It was difficult to determine what was wrong with him. A post mortem revealed serious congestion of the kidneys, but all other organs seemed to be normal. The veterinarian holding the post mortem reported that he died from inflammation of the kidneys.

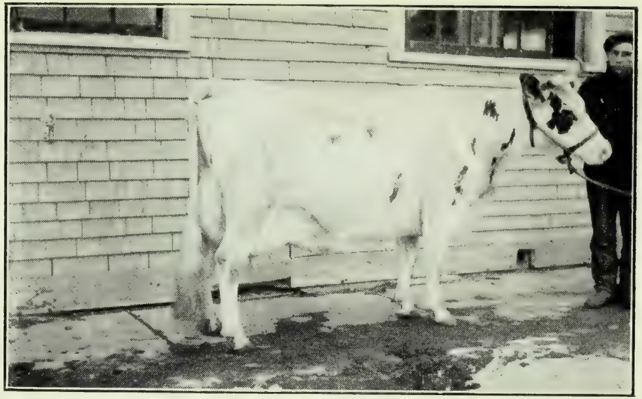
The bull Golden Ben, No. 95838, purchased to take the place of Brilliant Morning, is an excellent individual of good Shorthorn conformation and a show animal.

His sire was first prize bull in his class at the Toronto Exhibition in 1914. His dam was an excellent milker. Her qualities in this respect are indicated by the fact that she died of milk fever, something quite unusual with shorthorns. This bull therefore, although not bred especially along milk lines, carries a fair amount of milking blood along with his beef conformation.

The remainder of the herd is made up of seven young bulls, 7 cows, and 9 heifers.

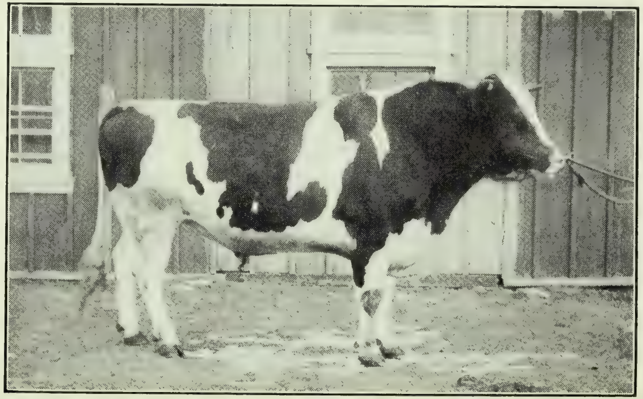
The following table shows the work done by the cows in the herd during the past year.

Victoria Calamity Clay, No. No. 6175. 1 year's record 22,835 lbs. Milk, 803.61 lbs. Butter. Owned by College Farm, Truro.



Scottie's White Floss, No. 25,691. 1 year's test: Milk 9,207.6 lbs. Butter 516.4 lbs. Owned by College Farm, Truro.

Jemima Wayne Sarcastic, No. 7208. 1 year's record 14,336.4 lbs. Milk, 560.4 lbs. Butter. Owned by College Farm, Truro.



Colony Canary Rag Apple, No. 14,038. Herd Bull at College Farm, See description in report.

Name.	Breed	Age	Best Year's Record				Date of last freshing	Sex of calf	Lbs. Milk since freshening to Nov. 1 1915	Remarks
			Days in	lbs. milk	lbs. butter	% fat.				
Maple Grove Louise DeKol..........	Holstein	14	291	11,226.5	626.68	3.83	Apr. 10-15	Heifer	6,175.9	....
Victoria Calamity Clay..............	"	10	365	22,835.0	803.41	2.81	Jan 18-15	Bull	18,789.1	....
Jemima Wayne Sarcastic...........	"	10	365	14,336.4	560.44	3.13	Mar. 12-15	Heifer	12,000.4	....
College Flora......................	"	8	341	10,587.5	497.65	3.22	Mar. 23-15	Bull	6,371.3	....
Spink's Butter Girl................	"	8	365	9,788.6	460.87	3.77	Dec. 17-13	Heifer	10,576.9	not breeding
Artis Rosie.........................	"	8	350	16,318.0	751.25	3.78	Feb. 2-15	Heifer	12,160.3	....
Emma of Evergreen 2nd............		7	365	16 737.6	654.03	3.13	Mar-22-15	Bull	10,862.7	....
Cobequid Rooker La Honda..........		7	295	9,731.1	444.89	3.66	May 11-15:	Heifer	7,848.4	....
Jean Aaggie DeKol..................		6	334	10,081.9	306.56	3.04	May 10-15	Heifer	4,160.4	....
Mechthilde de Pride................		5	365	12,082.3	498.30	3.29	Feb. 6-15	Heifer	10,467.9	....
Victoria Pauline Clay..............		5	365	11,568.2	548.90	3.79	Oct. 3-13	Bull	14,421.4	not breeding
Miss Mina Rooker...................	'	4	304	5,857.3	237.21	3.24	Oct. 11-15	Bull	260.7	....
Flora Rooker Posch.................	"	4	365	15,599.0	619.69	3.18	Jan. 27-15	Bull	13,553.7	....
Tidy Posch DeKol...................	"	4	365	9,141.3	359.37	3.14	Mar. 27-15	Heifer	7,551.0	....
Pauline Sadie Vale..................	"	3	294	7,341.2	340.84	3.71	Oct.-23-14	Heifer	7,341.2	....
Ida Rooker 4th......................	'	4	365	11,597.7	515.34	3.56	Nov. 16-14	Heifer	11,220.6	....
Pearl Rooker	"	3	205	4,578.9	195.30	3.41	Sep. 5-15	......	680.9	calf died.
Lady Mercena Mechlin..............	"	3	337	8,168.0	368.30	3.63	Nov. 10-14	Bull	8,168.0	....
Jean Aagie DeKol 2nd...............	'	3	216	5,102.4	231.12	3.62	Mar. 29-15	Bull	5,102.4	....
Craig 2nd of St. Annes...............	Ayreshire	6	346	7,474.0	418.91	4.48	May 29-15:	Bull	6,491.2	....
White Bessie........................	'	7	324	10,066.0	491.25	3.90	Jan. 22-15	Bull	9,054.9	....
Gardrum Bonnie Jean................	'	6	345	9,699.0	448.75	3.70	May 15-15:	Bull	8,042.3	....
Eastcourt Miss Buttons.............		5	340	8,549.0	422.50	3.95	Sep.-25-14	Heifer	8,640.8	....
Miss Doris..........................	'	5	265	6,723.5	303.16	3.61	Apr.-7-15	Bull	8,028.6	....
Eastcourt Merrymaid................	"	4	336	8,127.0	421.25	4.14	Feb. 18-15	Heifer	8,816.9	....
Princess Laurie......................	"	4	.....	....	......	....	Feb.-17-14:	Bull	1,516.1	....
Hillside Bright Smile................		4	311	6,133.7	291.09	3.79	Sep.-5-15	Heifer	1,874.8	....
Jessie 2nd...........................		4	219	3,012.6	138.89	3.68	Mar-25-15	Heifer	5,749.1	....
Princess May........................	'	4	365	7,294.2	337.30	3.69	Jan. 11-15	Heifer	1,623.3	....
Princess Beatrice...................	"	4	365	8,635.3	388.04	3.59	Dec.-9-14	Bull	8,199.3	....
Scottie's White Floss...............		8	317	9,207.6	510.40	4.43	Oct.-17-14	Heifer	9,207.6	....
Gardrum Brandy 2nd................	"	8	272	6,645.7	318.35	3.83	Dec.-19-14	Heifer	6,646.7	....
Lady Mac 2nd		2	201	2,845.5	171.54	4.82	Nov. 18-14	Heifer	2,845.3	....
Roan Fanny.........................	shorthorn	10	358	8,019.2	......	....	Jan. 3-15	Heifer	....	dead
Village Belle........................	'	7	365	5,155.2	......	....	Sep 18-15	Bull	1,359.1	....
Boyne Lady 3rd.....................	"	8	291	4,858.6	......	....	Apr.-29-14:	Heifer	4,858.6	....
Rosalind............................	"	5	111	1,502.0	87.31	4.65	Jan. 16-15	Bull	1,502.0	....
College Evangeline 14th............	"	4	245	4,811.2	240.58	4.00	Feb. 26-15	Bull	4,811.2	....
College Evangeline 15th............	"	4	147	2,433.9	110.34	3.23	June 2-15	Bull	2,433.9	....

The most outstanding record in the above table is that of Victoria Calamity Clay. She calved on Jan. 18th, 1915, and in the succeeding twelve months gave 22,835 lbs. of milk containing 803.41 lbs. of butter, 80% fat. She is a big cow and a great feeder. The following table shows what she ate during the year while she was producing the 22,800 lbs. of milk.

*Grain mixture	6180 lbs. at $1.50	$ 92.70
Turnips	136 bus. at 8c.	10.88
Silage	3100 lbs at 3.00 per ton	4.65
Hay	2140 " at 12.00 "	12.84
Green oats, peas and vetch	2280 " at 3.00 "	3.42
Soft Turnips	2500 " at 1.50 "	1.87
Pasture	4 months at 1.50	6.00
		$132.36

It will be noted that although this cow ate a very large amount of grain it reduced her appetite for roughage very materially, the amount of hay and silage eaten during the winter only amounting to $17.49.

If the butter fat in her milk had been sold at the average creamery price of 28 cents per pound it would have brought $179.96, and the skim milk at 25 cents per cwt., would have brought $45.67, making a total of $225.63. This leaves a good margin over feed cost to balance labor and various other items that can properly be charged to the cow. If all these items were included then she should be credited with about $20.00 worth of manure. Other cows that are doing well again this year are Artis Rosie, 12,160 lbs. of milk in less than 9 months; Emma of Evergreen 10,862 lbs. in seven months; Mechthilde DePride, 10,467 lbs. in less than 9 months; Flora Rooker Posch 13,553 in 9 months; Ida Rooker 4th, 11,597 lbs. as a 3 year old with her first calf. Among the Ayrshires White Bessie has given 9,054 in 9 months; Gardrum Bonnie Jean 8,042 lbs. in five months and 12 days; Miss Doris 8,028 lbs. in 6 months and 20 days; Eastcourt Merry maid 8,816 lbs, in 8 months; Princess Beatrice a young cow with her second calf has made a year's record of 8,635.

The average cost of feeding these cows would be better illustrated by the following table of the food eaten by Eastcourt Merrymaid than by the figures given for Victoria Calamity Clay.

Grain mixture	2943 lbs at 1.50	$ 44.14
Turnips	70 bus at 8c.	5.60
Silage	2500 lbs at 3.00 per ton	3.75
Hay	2140 " at 12.00 "	12.84
Green Oats, Peas, and vetch	2000 " at 3.00 "	3.00
Soft Turnips	2000 " at 1.50 "	1.50
Pasture	4 months at $1.50	6.00
		$ 76.83

This cow has given 8,816 lbs. of milk since last calving with an average test of 4.14. This equals 365 lbs. of butter fat and at 28 cents per pound is worth $102.20. Adding to this $17.63 for 7052 lbs. of skim milk makes a total of $119.83 as the income from her milk. Subtracting cost of feed from total income leaves $43.00 above cost of feed. This is a fair illustration of the returns that can be made by selling to the creamery the milk from a good cow. If her milk had been sold to the Bordens Condensed Milk Factory at $1.60 per cwt, it would have brought $141.05.

Swine.

The work with swine has been confined to the Berkshire and Yorkshire breeds. At present our stock consists of 7 Yorkshire and 5 Berkshire sows, one cross bred Berkshire and Yorkshire sow and one stock boar of each breed. The Yorkshire boar was bought in October from J. W. Callback, P. E. I. This boar is one of the finest we have ever seen. Competent judges have declared that he is not surpassed by any Yorkshire boar in Canada. He has large size with ideal conformation, good bone, and excellent quality. Although large and strong he shows no sign of coarseness. His name is Rosevale John 52nd, No. 45220.

During the year we raised 9 Yorkshire litters with an average number of 11 per litter, and 5 Berkshire litters with an average of 8 per litter. These pigs were nearly all sold at six weeks old for breeding and feeding purposes. The cross bred sow had a litter in August, and six of these were kept to use in an experiment in feeding. They were fed skim milk and middlings from the 21st. of August to the 22nd of January, 154 days. During the last two months some mixed grain raised on the farm was fed in addition to the middlings. They also ate a small amount of oil meal, and some mangels. The total feed eaten in 154 days is given in the following table:—

Middlings	1100 lbs	at $1.40	$ 15.40
Mixed grain, ground (Oats, barley, wheat and peas)	510 "	at 1.75	8.92
Rye (ground)	200 "	at 1.40	2.80
Oil meal	75 "	at 2.00	1.50
Mangels	20 bus	at .15	3.00
Skim milk	10200 "	at ¼c	25.50

Cost of feed.

Cost of feed	$ 57.12
Cost of pigs at 6 weeks old at $3.00	18.00
Total cost	$ 75.12

The total live weight of the pigs on Jan. 22nd was 1320 lbs, or an average of 220 lbs. each. The poorest pig in the lot was killed and dressed out over 75% of his live weight. Taking 76% as a fair average we find that the 1320 lbs. of live weight would give us 1003 lbs. of dressed pork. At the present time this pork brings 12 cents per pound in Truro and that would make the 1003 pounds worth $120.36. Subtracting total cost of $75.12 from $120.36 leaves a net profit of $45.24. Of course this takes no account of labor, neither have we credited the pigs with the manure made. The cost of butchering if deducted from the price received for the pork would amount to about $1.00 per pig, and would reduce the profit to about $40.00.

This feeding experiment shows the possibility of making pork at a profit where large amounts of skim milk are available. It should be noted that in addition to the net profit of $40.00 we have sold to the pigs at a good price 10,200 lbs, of skim milk that brought us $25.50, also 20 bushels of mangels for $3.00 and $8.92 worth of mixed grains grown on the farm. This makes a total return to the farm, outside of grain bought, from the six pigs of $82.54.

Requirements of the Department.

Most of the buildings are in fairly good condition The horse barn, however should have a room added for a harness and general work room. This can easily be accomplished by extending the present harness room which is too small in an easterly direction for about 20 feet. This would give room for hanging up team harness, washing carriages in winter, and for general rainy day work.

In conclusion I may say that the work of the year has been fairly satisfactory. Mr. Hooper as Farm Foreman and Mr. Retson as Herdsman have both done excellent work

The analysis of silage were made by Prof. L. C. Harlow of the Chemistry Department to whom I am indebted for kindly co-operation and interest in farm problems.

Mr. S. Moore of the Dominion Seed Department has as usual given us the benefit of his experience in the selection and growing of seeds and we appreciate his help.

During the past summer and fall the farm dairy has been in charge of Mr. Sweeney who graduated from the College in April of this year. He has been interested in his work, and faithful in its performance.

The records of experimental plots and of all animals during the earlier part of the year were kept by Mr. P. L. Sanford a 1914 graduate of the Agricultural College.

Since September this work has been in the hands of Howard L. Trueman who graduated from the College last April.

Respectfully submitted,

JOHN M. TRUEMAN.

PART 6.—POULTRY DEPARTMENT.

Truro, N. S.
December 11*th*, 1915.

Prof. M. Cumming,
Secretary for Agriculture,
Truro, N. S.

Sir:—I have the honor to submit herewith my 14th annual report as Manager of the Poultry Department.

I am very pleased to report an increase in the interest taken in Poultry Husbandry during the past year. The request for lectures on the subjects relative to Poultry Husbandry have been much greater that any previous year and as recorded in this report elsewhere, I have held more meetings throughout the Province than in any year in the past. Two new County Poultry Clubs have been organized and one has held a show while the other club is preparing to hold their first show in the near future. The remaining clubs have held shows and without an exception, the exhibits have been greater and of better quality than at any previous show.

During the past year the Poultry Department received from the Federal Department of Agriculture the same generous assistance which it has received in the past This special assistance was used for the purpose of constructing Demonstration poultry houses at the following places:—Arichat, Richmond County; Ardness, Pictou County; Mount Denison, Windsor, and Shubenacadie, Hants County; Dominion No. 4, Cape Breton County; and East Margaree, Inverness County. This plan of constructing houses of a particular type has proven to be effective. In one case, the demonstration poultry house under construction was visited by over fifty persons during its construction. An other case which came to my attention was the erection of six other poultry houses of the modern type in the neighborhood of one of our demonstration houses. The Federal Department grant also assisted us to supply to the school children 400 settings of eggs of pure bred stock. This distribution was made by the aid of the School Inspectors of the Province and in conjunction with Mr. L. A. DeWolfe, Director of Rural Science Schools. We purpose to continue this work and during the coming season to supply the eggs to children who have not yet received any of these eggs. In some cases the eggs did not reach their destination in good time, the delay causing injury to the eggs, but when brought to our attention we did what we could to replace and make good the loss which may have been caused by this delay.

The Series of Articles on Poultry which were published in connection with the last annual report were distributed to all persons who had made application. A number of copies are on hand and are mailed to all who make application for them. This publication was of great assistance to our work in supplying information on the care and management of Poultry. The Directory of Nova Scotia Poultry breeders assisted all who had received copies to locate the breeders of pure bred poultry nearest to their home and thus assist both breeders and buyers.

I addressed thirty meetings in different parts of the Province. These meetings were held in ten different counties and it is my intention to try to cover the remaining counties during the coming year. It is impossible to do every county each year as much as I would like to do so.

I judged the poultry exhibits at the Exhibitions held at Sydney, Halifax, Port Hood, Shubenacadie, Guysboro, St. Peters and Antigonish. At all the above exhibitions the exhibits of poultry were larger and better than in former years but owing to the early dates at which they are held, the poultry does not show to as good advantage as it does in November and December. During the fall months the young stock are not matured and the old fowls are not over their moult so as to show to the best advantage.

A Demonstration Two Pen Poultry house was exhibited at the Provincial Exhibition at Halifax by this Department. This house was visited by many persons and a large number of bulletins and plans distributed to persons who were interested. A pen of Barred Plymouth Rock and a pen of White Leghorn fowls were also exhibited, together with all the necessary fittings for the interior of the house such as trap-nest, feed hoppers, etc., etc. This house was built in sections at the College and shipped in a car to Halifax for the Exhibition. It has been returned to the College and will be again shipped to some other exhibitions in different parts of the Province.

In view of the present condition of the egg trade of the world and of the probability of Canada being called upon to supply the British Market with eggs in the future, it will be to the advantage of our Poultrymen and farmers to prepare to grade their eggs. It is also to be hoped that legislation will be obtained in the near future which will require all shipments to be properly graded and the grades to be marked on all cases of eggs for Export. This should help to protect the Canadian Poultrymen and insure a high standard for eggs from Canada on the British Market.

The Standard adopted by the Canadian Produce Association is here given. This Standard has also been adopted by the Dominion Department of Agriculture.

Classes and Grades.

Classes:—	Fresh Gathered	Storage	Cracked and Dirties
Grades:—	Specials		
	Extras	Extras	
	No. 1's	No. 1's	No. 1's
	No. 2's	No. 2's	No. 2's

Allowance for deterioration in transit 10 per cent, but none bad, i. e., Eggs should grade at point of delivery 90 per cent, of grade named at point of shipment.

Specials:—Eggs of uniform size weighing over 24 ozs. to the dozen or over 45 lbs. net to the 30 doz. case; absolutely clean, strong and sound in shell ; air cell small, not over

3-16 of an inch in depth; white of egg to be firm and clear and yoke dimly visible; free from blood clots.

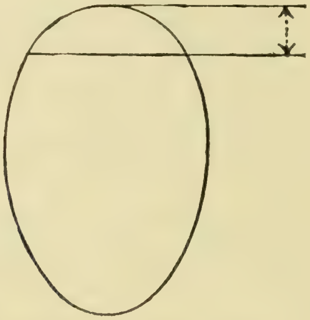
Extras:—Eggs of good size, weighing at least 24 ozs. to the dozen or 45 lbs. net to the 30 doz. case; clean; sound in shell; air cell less than 3-8 in depth; white of egg to be firm and yoke slightly visible.

No. 1's—Eggs weighing at least 23 ozs. to the dozen or 43 lbs. net to the 30 doz. case; clean, sound in shell; air cell less than 1-2 inch in depth; white of egg to be reasonably firm; yoke may be quite visible but mobile, not stuck to the shell or seriously out of place; air cell not necessarily stationary.

No. 2's—Eggs clean; sound in shell; may contain weak watery eggs, and eggs with heavy yokes, and all other eggs sound in shell and fit for food.

*Definition of grades in class Cracked and Dirties to be same as for grades in Fresh Gathered class except that the terms referring to soundness and cleanness are not to apply.

†To measure accurately the depth of the air cell the following method must be adopted. Measure from the points indicated by the arrows.



Permission was obtained and I judged the Poultry Show held at St. John's, Newfoundland in November, A splendid illustration of improvement in breeding poultry was here shown. Five years ago, the first show was held and during the past year one of the Colony's foremost breeders of White Plymouth Rocks and White Wyandotes was able to secure a large number of first premiums and three handsome silver cups at the poultry show held in Indianapolis, U. S. A. The birds which won these prizes were reared in St. John's and had to be shipped a long distance and not withstanding the great handicap won the admiration of all persons who saw the exhibit.

The Country Poultry Clubs continue to do some splendid work and their usefulness is no longer doubted. The

Antigonish County Club held a show in January, and another was held on December 2nd and 3rd. The exhibits at the latter numbered 530 fowls and were of a very superior quality compared to the exhibits at the show held in the early part of the year.

The Kings County Club held a show on February 10th to 12th, at Kentville. This show was a decided success and the Club have again decided to hold another show in the same town in the near future Four handsome silver cups have been offered for this year's competition and if one may judge by the interest shown the forthcoming show will be much larger and better than any yet held.

The Egerton Poultry Club held their show for Pictou County at Stellarton on November 17th to 19th. The exhibits at this show were of the usual high grade quality which has been characteristic of this club's show since its organization, eight years ago.

The Glace Bay Club held their show for Cape Breton County on December 14th and 15th. This show is making good improvement in poultry breeding and the industry is being promoted among the mining people of the neighborhood. There is no reason why a small flock of good fowls should not be kept by each miner and be a source of profit and pleasure to himself and family.

The newly organized Victoria County Poultry Club held their first exhibition of poultry in Baddeck on December 16th and 17th. This club made a splendid beginning. The exhibits numbered over one hundred and some were of excellent merit. It was not to be expected that the first show should be a very superior one but all who saw the exhibits expressed themselves as being pleased with the fine quality shown. Much interest was shown by the exhibitors in a competition for the best exhibit of any one breed of fowls. The premium for this exhibit was a handsome silver cup donated by Hon. George H. Murray, Premier of the Province. This cup has to be won three times before it becomes the property of the exhibitor.

The Annual Meeting of the Nova Scotia Poultry Association was held at the College on Thursday evening, January 14th. A fairly representative number of poultry men were in attendance and matters of importance to the different poultry clubs were suggested and discussed. A uniform prize list was presented which will be used in all the County Poultry Shows. The protection of members against unsatisfactory dealers in stock and eggs was also dealt with and all members were required to write the Secretary and have the difficulties settled in the name of the Association. Failing a satisfactory settlement, the Secretary was to make known the names of all unreliable dealers to the members of the different clubs.

The egg circles of the Province have not had a continuation of success. For several reasons, the principal being the double freight rate, the Musquodoboit members decided that private marketing would be to their best advantage for the present. They gave up the work and discontinued the weekly collecting. A number of the circle members would have preferred to have the circle continued but they did not have enough eggs to make it worth the expense of keeping the Collector on the road twice each week.

The Scotsburn Circle has continued their collecting of eggs and have given entire satisfaction to the patrons of the creamery.

The Pugwash Jct. Circle made a success of the work and have marketed nearly five thousand dozens. The experience obtained from conducting these circles in this Province has lead me to believe that fifty members having an average of fifty hens within one day's drive of one another are required before a start should be made in the conducting of an egg circle.

I would like to call the attention of egg dealers and grocerymen in the Province to the custom of exhibiting eggs in store windows during spring and summer months. The eggs which are received are very often exposed to a high temperature and incubation readily starts at over seventy degrees thus causing loss and dissatisfaction to the customers. A much better method would be to keep all eggs in a cool compartment, in the store which is free from foul odours and use neat display cards in the windows of the stores stating the quality of the eggs and the price per dozen.

During the past year we raised on the College Poultry Plant 820 chickens, 30 ducks and 18 Toulouse Geese. The surplus stock not used on the Plant was marketed as has been done here-to-fore.

An experiment was conducted with a flock of 117 chickens to determine the cost of feed etc., consumed. It is not necessary to here place all details of feed consumed and increase in weights per week. The cost for feed alone for sixteen weeks after hatching was $17.84. The chickens weighed at the end of the sixteenth week 2.6 pounds each. They were brooded in the Simplex Brooder house for six weeks, afterwards placed in a Colony house and had free range.

The Simplex Brooder house has again given every satisfaction. This year an experiment was conducted by placing pans of water in the house with the chicks in order to increase the moisture present in the heated room where the brooder stove is located. This plan has proven very satisfactory and makes a healthier air in the chick compartment which was needed.

The amount of moisture in the air of the incubator cellar has also an influence on the strength and vigor of the chickens hatched in incubators. Persons who have had only fair results in hatching chickens by artifical means will find it to their advantage to procure a relative humidity thermometer and supply more moisture to the eggs during incubation.

The price of feeds during the past year has handicapped our work and for the future I would respectfully suggest that this department be given some land for the purpose of growing a portion of the grain feed required for feeding the fowls. We are only able to grow what vegetables are required on the limited area we now have under our control.

In conclusion I wish to place on record my appreciation of the faithful and satisfactory services of Mr. Dan McInnis, my assistant who has had charge of the College Poultry Plant during the greater part of the year.

It is also a great pleasure to record again my sincere thanks and appreciation of the many evidences of interest and kindly advice which you have shown and rendered me in conducting the work of this department at the College and throughout the Province.

All of which is respectfully submitted.

J. P. LANDRY.

Part 8—REPORT OF THE SUPERINTENDENT OF DAIRYING.

December 31st, 1915.

Professor Cumming,
Truro.

Sir:—I have the honor to submit this, my fourth Annual Report, as Dairy Superintendent, being for the year ending Nov. 30th, 1915.

From the standpoint of development, perhaps, the main outstanding feature of the year's work was the initiation of Registration of cheese Factories and Creameries which was inaugurated on May 1st in accordance with the Act passed by the Legislature on the 14th day of May, 1914.

Twenty-eight cheese factories or creameries made application for registration. These were visited by either my assistant or myself and 21 certificates of Registration were granted. The other seven were given permits for the year only, as from unsanitary or other reasons it was not deemed wise to grant the regular certificate.

The fact that all our cheese factories and creameries have now got to keep up to a certain standard of excellence ought to give the milk producer more confidence that his milk products were being properly manufactured and better assurance of receiving the highest price for the same, and to the customer an assurance that the quality of butter turned out from our creameries is of the highest possible quality.

Next of importance would come the inauguration of cream grading. The importance of this work was impressed upon the Dairymen at the Annual Convention in Jan. by Mr. Geo. H. Barr, Chief of the Dairy Division at Ottawa, but it was thought wise not to move too quickly in the matter and I made no particular recommendation to the creamery men until it was tried out first in our Government Creamery at Baddeck. A short report of which is given in the report attached by the Creamery Manager, Mr. J. R. Sutherland and from our experience there I feel it is time we were recommending the adoption of cream grading in all our creameries and the detail of it will have to be taken up more fully during the coming year. In the report of the Baddeck Creamery will be found the itemized amounts placed in 1st and 2nd grade during the year.

The question of quality in our creamery butter is becoming of greater importance as the quantity is increasing and some butter is being offered for export and cold storage during the summer months. Therefore, every effort must be put forth to encourage our creamerymen to use the greatest care and precaution in having the cream properly delivered to the creamery and afterward see that everything in and around the creamery in the best possible condition to manufacture the highest quality.

In regards quantity, each year since I was with the Department we were able to report a substantial increase in the quantity of creamery butter manufactured and this year shows the greatest increase of any year, showing 34% over 1914 and 478% over 1910. The total amount this year being 1.240,483 lbs. as compared with 913,273 lbs. in 1914. The value of this was about $359,661.14.

The quantity of cheese manufactured showed an increase of 9447 lbs. over the previous year. The same number of factories operating but no reasonable improvement can be recorded in the cheese business but I am still of the opinion that some day the industry will revive in many sections and when started on the proper basis it will no doubt develop to quite a large extent.

It is gratifying to note that all the creameries started in recent years, are developing yearly and to date there is none of them but what is making a success.

Following the lead at Scotsburn which again shows an increase of 16000 lbs. over 1914. All the new creameries have made decided gains.

The Pictou County Dairy Company showed an increase of 70,000 lbs. over their first year, and can now be considered an unqualified success and situated so that it can economically serve a very large radius of country. They have recently taken another forward step and this winter are installing the first mechanical refrigerating plant of any creamery in the Province. This will put them in a position to successfully store their summer output for the winter months when butter is scarce and will be equally advantageous to the producer and the consumer.

The greatest individual gain was made by the LaHave Creamery Co. at Bridgewater, increasing from 37059 lbs. to 132935 lbs. and the prospects are for a still greater gain in 1916. Other noticeable gains are at South River, Meteghan and Brookfield and for the first time a very noticeable gain and general interest in the Annapolis

Valley creameries, Wolfville increasing from 50000 to 80000 lbs. and Lawrencetown increasing from 10000 to 42500 lbs. A renewed interest in Dairying is now apparent all over the valley and we can hopefully look for splendid gains there in the next few years.

The policy inaugurated in Cape Breton two years ago of starting a demonstration creamery has met with good success, our creamery at Baddeck showing an increase of 109% or from 17486 to 36676 lbs. this year and every prospect of it being on a paying basis by another year. A more detailed account will be found in the report of the Manager which is attacked to this report and the financial statement.

Mr. H. S. Cunningham, the Cape Breton representative again made his headquarters in the creamery office during the year. This arrangement works very satisfactory to both and we are much indebted to Mr. Cunningham and his assistants for much help given us especially among the patrons who they had an opportunity of meeting, and coupling together much interest is shown in the aim to keep better stock, grow more feed and get a more profitable Dairy cow.

The interest created surrounding Baddeck has spread over the Island and during the year a demonstration creamery was built at Margaree Forks in Inverness County on the same agreement as at Baddeck and will commence operations in the Spring. The prospects there are splendid, very much interest is manifest. The country is splendidly situated to support a local creamery, and no doubt the development made at Baddeck will be at least duplicated.

Two new creameries commenced operations during the year. Both co-operative companies, one at Malignant Cove, Antigonish County, and the other at Sterling Brook, Hants Co. It is worthy of note that both of these had a much larger output for the first year than any that were started a few years ago and can be termed another evidence of the increase interest in the Dairy cow.

The Dairymen's Association held their annual convention at the College of Agriculture during the time of the Short Course in Jan. and was by far the largest attended and most enthusiastic yet held.

Mr. Geo. H. Barr, Chief of the Dairy Division at Ottawa presented by chart the importance of cream grading showed results as obtained in other Provinces and recommended it as the main solution of the problem to get better butter.

Mr. Harvey Mitchell again impressed on the Convention that if Dairying was to become a permanent success in Nova Scotia, that greater efforts must be put forth, to get better producing cows.

A constitution for the association was adopted and the following officers re-elected for the year;

Pres.—D. W. Murray, Scotsburn.
Vice-President.—R. B. McLennan, Brookfield.
A. M. Wheaton, Wolfville.
Director—C. R. DeLong, New Germany.
Secy.-Treas.—W. A. MacKay, Truro. The above named to constitute the Board ofDirectors.

Many questions of interest to Dairymen were dealt with. It was decided to hold the next convention at Truro during the Short Course in 1916 and to have a creamery butter exhibition in connection at time of writing all is in readiness for this convention and prizes to the value of $350 for the exhibition including a challenge trophy of a value of $125 donated by the Butter Buyer's of the Province to be held for one year by the owner of the highest scoring butter on Exhibition, but must be won three times before becoming his absolute property. Much interest is manifested in this and a very keen competition anticipated.

During the month of January, February and March my time was taken up by the Dairy Instruction work in the college and at some of the Short Courses, I also attended as many of the Annual Meetings of the creamery companies as possible.

A large portion of the regular instruction and inspection work I consigned to my assistant, Mr. W. J. Bird, who done his work faithfully and well and whose report is attached to this report. It was the intention to keep Mr. Bird on the service during the Winter months but he heard the "Call to Arms" and left us in Sept. to prepare to enlist in the Military service.

I held or addressed thirty-three public meetings largely in different parts of Cape Breton, in the Margaree Valley, and also held in company with Mr. Mitchell a series along the Mira River as much interest as apparent there now over dairying.

I attended a picnic at Dunistaffanage, P. E. I. in July in the interest of Dairying and also a picnic on July 1st at Malignant Cove where the new creamery was formerly opened in the presence of over 1300 people.

The office requires more of my time each year and I find that I will require more office help during the coming year.

Considerable time was spent in connection with the Flour and Feed mill that is established in Cape Breton and of which I make a separate report.

As usual I attended as many of the Exhibitions as time would permit and also assisted with conducting the milking competition in connection with the Winter Fair at Amherst.

The regular grants to new creameries was paid during the year and some special assistance in some cases where the circumstances warranted it.

Although the year showed many signs of encouragement in the increased output of creamery butter and the interest taken in the Dairy Cow in now almost all parts of the Province and while it is also apparent that there has been real development and that the average production per cow has increased somewhat in her output of milk and butter fat and while in many sections splendid development has taken place, it is noticeable that these sections are where there is a well organized and well managed creamery, coupled with the cow testing association operated by the Dominion Dept. of Agriculture.

The fact is then pressed on me more forcibly than ever, that before we are going to have a real permanent development in Dairying, the average production per cow has got to be raised by at least 2000 lbs. of milk and 80 lbs. butter fat per year and to do this some much more tangible and practical work has got to be done until every cow owner knows what his cows are doing and until he has the determination to go ahead and keep only profitable cows and this can only be done through the medium of the scales and the Babcock Tester. The Dominion Dept. are doing a splendid organization work along this line and directing much energy and money but still are only touching a comparative few. How the work is going to be completed is not yet worked out, but it is the gigantic problem in front of the Dairy business and that must be met if the business is going to flourish.

I desire here to place again or record my appreciation of all valuable work being done by our Dominion Dept. through their representative, Mr. Harvey Mitchell, and also to many others of the Dept. who have given me much valuable assistance and encouragement during the year.

My appreciation is also due for the amount of the Federal Grant that was apportioned to Dairying. This made possible much work that could not otherwise be undertaken.

In the following pages will be found a detailed statement of the business done by the different cheese factories and creameries during the year.

I feel that a report this year would not be complete without making mention of our boys who have left the creameries and cheese factories and enlisted in the Military service, and of a total of less than 60 men engaged in our work at least ten have answered the call as follows;

W. J. Bird, Asst. Dairy Sup't.
John K. Campbell, Scotsburn.
Geo. G. Campbell, Scotsburn.
Clarence Holmes, Stellarton.
Don Chipman, Yarmouth.
Harry Rogers, River Herbert.
Walter Leslie, River Herbert.
Burton Treen, Malagash.
Gordon M. Hebb, Bridgewater.
Wm. Hughes, Berwick.

In conclusion I thank all who have in one way or another assisted in making my work impressive and profitable during the year.

Respectfully submitted,

W. A. MacKAY.

December 4th, 1915.

W. A. Mac Kay, Esq.,
Truro.

Sir:—It is my pleasure at this time to submit to you my report of work done in the instruction and inspection of creameries and cheese factories.

During the season factories were visited as often as time and conditions would permit.

The object was to give general information on the manufacture of butter and cheese which would result in the best quality and a uniform product throughout the Province to assist in keeping the building and machinery clean and in good working order.

The conditions of the factories in most cases was found to be good, but in some of the older buildings improvements could be made.

The sampling of cream and preserving and testing the composite sample was, as far as could be observed, very carefully carried out by the butter-makers.

About 800 composite samples of cream were tested personally. This work served a dual purpose, to give instructions on testing to the Managers and secondly to check their own work. It was interesting to know that the result in every case compared very closely to work which was done by the managers themselves. Such conditions are most satisfactory to all concerned.

The ice supply, which is very important in the manufacture of butter, was noted to be short in some factories. This was due, to some extent, to the difficulty in securing suitable ice last Winter. Those in charge of harvesting ice for a creamery should always be sure, if at all possible, to secure a sufficient supply and see that it is thoroughly packed. The quality of the butter was good. The improvement in quality lies, to a great extent, in the hands of the farmers. It should be the ambition of those who patronize the creamery to send only first grade cream and to co-operate with the Manager and establish a reputation for quality of butter, which is the greatest advertisement for any creamery. The Bayview Creamery Co., Ltd. of Hants Co, and the Milburn Creamery Co. Ltd., Antigonish Co. both newly opened this year. Time was spent in assisting in getting the factories in working condition, making the first butter and cream tests.

A personal visit was made to 120 farmers, in connection with their local creamery. The business methods and objects of co-operative creameries were explained. The principles of the Babcock test, in relation to the payment of cream on the basis of the percentage of butter fat were described as clearly as possible. Instructions was also given for the care of cream on the farm, emphasizing the necessity of cleanliness and thorough cooling.

By the farmer and factory managers, advice and instructions was received in the most agreeable manner, making them very more pleasant.

Yours truly,

Sgd. W. J. BIRD.

Baddeck, N. S., November 20th, 1915.

W. A. MacKay, Esq.,
Truro, N. S.

Sir:—I submit the following report as the Manager of the Baddeck Creamery during the past season.

Owing to an early spring we were able to open the creamery earlier this season, beginning operations May 3rd and doing a good business from the start.

There was a marked improvement in the quality of cream received during the season. Due partly to the patrons who sent cream last season and knew how to care for it properly and to the grading system which was adopted with fairly satisfactory results. The cream is graded when weighed in as follows. No. 1 grade indicated by a white tag is given to all the cream that is not over-ripe, smooth, of a good flavor and testing not less than 20%.

No. 2 indicated by a yellow tag given to all the cream that is over-ripe, off flavor, and testing less than 20% butterfat. Paying two cents less per pound butterfat than for First grade cream. At the first the patrons objected to grading especially those who sent cream for the first time this season but when they understood it properly it was found to be satisfactory. The chief difficulty was in regard to transportation in some cases the cream is often exposed to the sun for several hours, as a result it reached the creamery in bad condition through no fault of the patron. As this was the first season for the grading system, I did not grade very closely, it being my idea to raise the standard as the people understood the system better.

The business although still in its infancy in Cape Breton seems to be taking a firm footing, the patrons show more interest in the creamery, and there is evidence of greater confidence than ever expected. The output, although small compared with some of the larger creameries in the Province was very encouraging, making 36,676 lbs. of butter which is an increase of over 109% over last season.

The production end of the business still needs every encouragement. The practice of having the cows freshen in the spring and go dry in the early fall is still prevalent among the majority of our patrons and until they realize the advantages of winter dairying they are not doing justice to themselves or to the dairy business.

The opportunities for development are still very great there being sections within reach of the creamerythat have not yet been touched. We were gratified in receiving a large supply of cream via S. S. Richmond from points between St. Peters and Grand Narrows being transferred to S. S. Blue Hill at a later place and thence to Baddeck. As the Richmond does not call at all points regularly, I would suggest that a gasoline boat be put on the route to call at all points between St. Peters and Grand Narrows, provided we get enough support. I think this would be a great asset to the creamery and to patrons sending cream from the points mentioned.

The prospects for the coming season are very encouraging practically all the patrons are entirely satisfied and there is every proof of increasing the output by at least 50% next season.

In conclusion, I wish to thank yourself and all who assisted me in my work and would again solicit the co-operation of all within reach to make the season of 1916 the most successful in the history of the Baddeck creamery.

(Sgd) J. R. SUTHERLAND,
Baddeck.

Baddeck Creamery.

Statement of Business done during the Season of 1915.

Capital Account.

Cost of plant and equipment paid in full.........	$6592.16

CASH ACCOUNT.

Receipts		Expenditures.	
Balance in Bank Jan. 1	23.30	Patrons for Cream	8668.52
Dept. of Agriculture on Capital Account	44.54	J. R. Sutherland's salary and expenses	470.63
" " " for ice	173.03	J. A. McKay, salary	177.70
" " for Margaree Creamery	10.40	Storing Ice	173.03
Ehrhardt Bros, Butter etc	3162.17	Crockett Bros. Cream Cans etc	226.20
N. H. Gillis "	751.18	Insurance	50.00
Harris Abattoir Co., Ltd. Butter, etc	2942.92	DeLaval Dairy Supply Co	77.25
Smith & Proctor, Ltd. "	810.90	A. S. McDonald, freight	190.01
Morrison & McInnes "	389.85	Wallace Rice, butter boxes	33.00
D. R. Nicholson "	84.70	Donald Pringle, transferring cream	42.00
Cash Sales "	1199.24	Postage	16.00
Glace Bay Co-Operative Co "	185.90	Printing and stationery	63.50
J. D. McLennan "	69.96	Coal	57.15
Small Sales "	432.44	Exchange	15.84
Over draft in Bank, Dec. 31	96.00	Tile for sewer	7.86
		Small supplies	107.84
	$10376.53		$10376.53

STATEMENT OF ASSETS & LIABILITIES DECEMBER 31st, 1915.

Assets		Liabilities.	
Plant and Equipment	$ 6592.16	Dept. of Agriculture for plant and equipment	$ 6592.16
Inventory Capital Account	67.58	Department of Agriculture balance on current account	1022.54
" Current "	353.23	Outstanding accounts	18.10
Outstanding accounts (good)	240.65	Year's Int. on Capital Account at 5%	329.60
Excess of liabilities over assets	804.78	Balance on Cash Account	96.00
	$8058.40		$ 8058.40

Note.

The liabilities on Dec. 31st, 1914 were $536.25 greater than Assets, On Dec. 31st, 1915 they were $804.78, leaving loss year's trading at $268.53, including interest on capital but not on balance on current account.

Not including any interest there would be a credit balance of $61.07. This, however, does not include Mr. Sutherland's salary up to June 1st., or salary and expenses after Nov. 15th.

BADDECK CREAMERY.

Monthly Reports.

1915 MONTH	Total Pounds Cream Rec'd.	Total Pounds Butter Made	Tota l Pounds Butter Fat	Value of Butter Made	Manf. Exp. at 3¼ cts. Per Lb.	Value of Buttermilk Sold.	Exp. of Handling at 25% of Sale	Net Value to Patrons	Value of Cream Sold
May	7965	2602	21993.	794.14	84.56	18.52	4.63	13.89	8.30
June	22054	7068	5706.3	2005.09	230.72	20.39	5.10	15.29	30.68
July	37238	11378	9768.5	2976.62	369.78	27.58	6.89	20.68	59.41
August	27279	8280	7287.4	2228.22	269.10	34.61	8.65	25.96	61.36
Sept.	14133	43720	3868.0	1232.78	142.09	23.16	5.97	17.37	43.64
Oct.	7637	25580	2159.5	775.63	83.13	16.50	4.12	12.38	7.75
Nov.	1367	4180	385.4	128.89	13.59	1.00	.25	.35	2.60
Total	117673	36676	31374.4	10141.37	1192.97	141.76	35.43	106.33	213.74

MONTHLY REPORTS

(Continued.)

Expenses at 25% of Sales	Net Value to Patrons	Value or Ice-Cream Sold	Expense at 40% per cent of Sales	Net Value to Patrons	Total Money Due to Patrons
2.07	6.23	0.00	0.00	0.00	729.70
7.53	23.15	5.35	2.14	3.21	1816.02
14.87	44.54	8.20	3.28	4.92	2676.99
15.34	46.02	10.80	4.32	6.48	2037.58
10.91	32.73	1.00	.40	.60	1141.39
1.94	5.81	......	....	....	710.69
.65	1.95	......	....	....	118.00
53.31	160.43	25.35	10.14	15.21	9230.37

Total Receipts to Creamery	Value of Fat Grade No. 1	Value of Fat Grade No. 2	Lbs. Fat Grade No.1	Lbs. Fat Grade No. 2	Overrun for Month
91.26	3.3	31.	2160.9	38.4	18
245.49	31.25	29.25	5149.1	557.2	23
394.82	27.75	25.75	9121.4	647.1	17
297.41	27.25	25.25	6873.1	414.3	13
159.19	30.00	28.00	3744.1	123.9	16
89.19	32.5	39.5	2152.0	7.5	17
14.49	31.0	20.0	381.6	3.8	10
1291.85	30.39	28.39	29582.2	1792.2	16.3

REPORT OF THE CHEESE FACTORIES AND CREAMERIES FROM DEC. 1, 1914 TO NOV. 30, 1915.

County	Registration No.	Name of Factory or Creamery	Name of Prop., Pres., Secy. or Mgr.	Name of Cheese or Buttermaker	P. O. Address	No. of Patrons	Lbs. Milk Received	Lbs. Cream Received	Lbs. Butter Made	Qts. Ice Cream Made	Qts. Sweet Cream	Lbs. Cheese Made	Value of the Business Done
Annapolis	1	Lawrencetown & Co., Ltd	J. B. Jefferson	A. L. Crosby	Lawrencetown	140	125240	205690	42500			12616	$13108.00
Antigonish	2	South River Cry. Co., Ltd	John T. Keating	Alex. Cameron	Loch Katrine	206		239611	80411				21928.51
	3	Milburn Cry. Co., Ltd	J. A. MacDonald	H. A. McDonald	Malignant Cove	151		106927	30959				8121.58
	21	Farmers Milk Post Co., Ltd	J. R. Thompson	J. E. Falt	Antigonish	20	336600	39060	3253				
	Permit	*Hygiene Fresh Milk Co	L. C. Archibald	Angus Fraser	Antigonish	45		*	1000			322	
	"	Antigonish Cheese Factory	Thomas Somers	Angus Cameron	Antigonish	37	214987					2000	3300.00
	"	Argyle Cheese Factory	Geo. Vinten		Lower South River		no rept						
	"	Upper South River Factory	"	D. Boyd	" " "		161250					15000	2050.00
	"	Marydale Factory	"	John McAdam	" " "		266100					25100	3600.00
	"	Glassburn Factory	"	D. A. Chisholm	" " "		162000					15090	2150.00
	"	Erinville Factory	"	J. Reddy	" " "	20	114000					10500	1600.00
Colchester	4	Brookfield Cry. Co	R. B. McLennan	W. L. Brenton	Brookfield	91	171028	154400	42324	1067	17032		18455.00
	5	Economy & Bass Riv. C. &. B. Co	S. H. Fulton	W. C. Lewis	Little Bass River	35	180027	19890	13740				4100.00
	6	Glenholm Creamery	T. D. Blaikie	Edwin Blaikie	Glenholm	25		38912	12017				3501.90
	7	Gt. Vil. Cry.,	T. D. Blaikie	T. D. Blaikie	Great Village	47	527446	61299	28595		15000		13820.40
Cumberland	8	Cumb. Co-Op. Cry. Co, Ltd	W. A. Landels	H. M. Aikins	River Herbert	55		128800	36742	2120			10980.00
	20	Malagash C. & B. Co	J. T. Treen	Burten Treen	Malagash Centre	34	479460					44952	6650.07
Digby	9	Clare Cry. Co., Ltd	L. C. LeBlanc	L. C. LeBlanc	Meteghan River	130		85000	26000				7178.56
	10	La Societe D Industrie Lacture Ltd. of Meteghan	Zacharie Melanson	Narcisse Roberge	Meteghan	86	403618		21430				6000.00
Hants	11	Bayview Cry. Co Ltd	B. H. Powers	Douglas Dickie	Sterling Brook	70		98000	28000				8000.00
Lunenburg	12	La Have Cry. Co., Ltd	G. M. Hebb,	J. D. McKenzie	Bridgewater	225		421363	132935	7080			41010.10
Kings	13	Acadia Dairy Co., Ltd	A. M. Wheaton	A. M. Wheaton	Wolfville	150		385000	85000				25000.00
	14	Acadia Creamery	G. R. Toole	G. R. Toole	Kingston	12		52000	13000				3900.00
	15	Fairview Cry	F. A. Illsley	F. A. Illsley	Berwick	50			23000				7360.00
Pictou	16	Scotsburn Cry Co. Ltd	Robt. T. Stewart	Alvin Graham	Scotsburn	500		908919	290491				83375.00
	17	Pictou Co. Dairy Co, Ltd	Harold Falconer	Harold Falconer	Stellarton	265		365986	107443				28000.00
Victoria	18	Baddeck Creamery	J. R. Sutherland	J. R. Sutherland	Baddeck	143		117673	36676	100	710		10522.12
Yarmouth	19	Yarmouth Cry Co., Ltd	F. E. Porter	Frank Doane	Dayton	375		569028	174967		2429		52300.00
						2892	3141756	3992558	1240483	10367	35171	125580	386011.24

*Main business Hormogonized milk and cream.

On the 2nd. of December I inspected the plant and equipment known as the Woodworth Mills at Berwick. They have installed a 40 barrel Midget Major Flour Mill, and a buckwheat and barley flour mill, have fulfilled the requirements and consequently I recommended that the grant of $1000 as provided be paid.

All of which is respectfully submitted.

W. A. McKAY.

Nova Scotia Government Cereal Mills, South Baddeck, Creamery in the Background

The beginning of a New Era in the Margaree Valley. Laying the foundation of the Margaree Creamery., September 5th, 1915.

Report on Flour and Feed Mills.

Truro, December 31st, 1915.

Professor M. Cumming,
Secretary for Agriculture,
Truro, N. S.

Sir:—In connection with the estimates passed in the Local Legislation at the last session re assistance to Flour and Feed Mills, I was asked to superintend the erection of a Flour and Feed Mill at Baddeck to be run as a demonstration or experimental mill to make flour, oatmeal and feed. This being a new thing in the province I spent considerable time in investigation work before proceeding, visiting several of the different types of mills in New Brunswick, and P. E. Island, to ascertain the most suitable equipment that could be installed to meet the particular needs of the province and would act as an incentive to the production of home grown grains to make the flour, oatmeal and feed rather than having these imported from outside the province.

What was required was a small type mill that would give effectual service at a reasonable cost for operating. The selection was made of a Midget Marvel Flour Mill of 25 barrel capacity, a standard smoke kiln, oatmeal grinding plant of about 40 barrel capacity and a feed grinding plant of about 2500 lbs. feed per hour, all operated by a large Gasoline Engine and contained in a specially constructed building built of wood and cement basement. At date of writing the flour and feed mills are in operation and the oatmeal mill will be in a short time.

The services of George E. MacLean, late manager of the McLean Milling Co., Ltd., of Amherst, have been secured as manager. An up to date McCaskey system of accounting is being installed, and the mill will be operated on a commercial basis, charging the ordinary prices for milling the different products.

The installation of this plant is very popular in the surrounding country. Arrangements are made to get grain for long distances, and the prospects are that this will act as a great stimulus in the revival of the grain growing business, and will in time make farming more profitable than it has been in the past.

PART 8—REPORT OF THE CHEMIST.

L. C. Harlow.

M. Cumming, Esq.,
Secretary for Agriculture.

Sir:—I have the honor to submit my third annual report of the work of the chemical department of the Agricultural College.

The work of this department may be grouped as:—

(1) Instruction.
(2) Routine Analysis.
(3) Experimental.

1. *Instruction*:—During the last College year the classes were conducted in the chemical laboratory of the Normal College. The Agricultural College appreciated very much the co-operation of Principal Soloan and Mr. Scott of the Normal College in making it possible, often at their inconvenience, to carry on our work in their laboratory. The suggestion that an optional course in chemistry should begin two weeks before the regular term opened, was acted upon and five students entered October 19 and spent half of each day in chemistry.

The plan was to make this special course largely a laboratory course; but on account of the new laboratory not being fitted up the work was wholly demonstration by the instructor.

The same unsatisfactory method of teaching has of necessity been followed with the regular classes. Very soon we expect to occupy our new laboratory which will provide any student attending this institution with the opportunity of laying a good foundation of experimental Agricultural Chemistry and Soil Study.

During the year, I have attempted, at several public meetings, by talks with the owners of land where samples have been obtained, by correspondence after soils have been analyzed, and by circular letters to give such information as has been gathered regarding our soil conditions.

While teaching in the Normal College laboratory apparatus and supplies were purchased jointly by the Agricultural and Normal College; much time has necessarily been taken in sorting out material to be transferred to the Agricultural College, in ordering new apparatus, and in arranging various details incidental to occupying a new laboratory for general agricultural analysis.

II *Routine Analysis*:—As it becomes known that soils, water, fodders, the various forms of lime, etc. may be analyzed here, this branch of the work increases.

This year 158 samples have been received. These are classified as follows:—

Sections		No. of samples.
1.	Drinking water	2
2.	Boiler water and scale	1
3.	Lime for Bordeaux mixture	8
4.	Limestone rock, shells, marl	43
5.	Gypsum	3
6.	Manures	10
7.	Ordinary soils	70
8.	Muck soils	21
		158

The following notes on some of these sections may be of interest.

Section 3.

The Entomological Department furnished eight samples of lime obtained in St. John. These are used in the preparation of Bordeaux mixture and lime sulphur spray. The following results show the wide variation in commercial lime:—

	1	2	3	4	5	6	7	8
Water....................	8.95	1.15	9.6	11.75	3.7	.45	1.5	.85
Lime.....................	86.	92.	86.5	84.50	75.5	60.	92.	94.
Magnesia..................	1.2	2.	.36	1.44	14.5	34.5	2.9	1.
Iron and Alumina...........	2.	2.	1.25	2.	2.3	3.1	.55	1.3
Insoluble..................	1.6	2.95	2.40	.3	4.05	1.65	3.1	2.3

Bull. 115 Pennsylvania State College says in speaking of lime for lime-sulphur spray:—The lime should contain not less than 90% Calcuim oxide (lime) and preferably 95% or more, with as little magnesia as is commercially practicable. The latter preferably should not be over 3%.

There are two defects in the composition of some of these lines; first, numbers, 1, 3 and 4, from the high percentage of water, are partially slaked, second, the high percentage of magnesia in numbers 5 and 6. Both of these factors, being high in these cases, lessen the percentage of lime and so throw out the balance of the formula.

Section 4.

The limestones, shells and beach mud of section 4 were sent in with a view of ascertaining the amount of lime available for correcting the acid of soils. Among these the following are deserving of mention.

(a) Air dried beach mud from Dingwall, Victoria Co, analyzed as follows:—

	%
Water	2.10
Organic Matter	7.05
Potash	.39
Phosphoric Acid	.35
Lime	.4
Magnesia	1.6
Nitrogen	.2
Insoluble material, Iron and alumina	87.76

These figures show this to be about the same as an ordinary marsh soil; it may pay to haul such material a very short distance to be applied to a light soil.

(b) Shells from New Glasgow.

	%
Carbonate of lime	42.
Insoluble material	55.5

The idea that lime, in some form, is worth adding to the soil is leading many to examine the natural resources of their locality with the result that about 40 samples of limestone, marl and gypsum have been submitted for analysis.

The value of the first two depends upon the percentage of *carbonate of lime* since this is the form of lime which corrects the acid condition of the soil. Most of the limestones contain impurities as clay, sand, oxide of iron, etc., but will give about 90% carbonate of lime. Some run as low as 60% others as high as 96%. See the article on lime in this report for analysis of various limestones of Nova Scotia.

Section 5.

In several cases gypsum has been sent in as limestone; while gypsum contains about 32% lime it cannot destroy the acid of the soil; however, it is of agricultural value in the following ways:—

(1) It supplies lime as a food for the plant.

(2) It sets free potash from the insoluble compound of the soil.

(3) When put, at the rate of one half pound per day for each animal, with manure which is giving off ammonia, it tends to hold the latter so that it does not escape into the air, but is available for use in the soil.

In the few of our soils, *which are not acid* gypsum, finely ground, may be of more benefit to the soil than limestone. Since acid phosphate is partly sulphate of lime or gypsum, the mineral gypsum can be of no value where acid phosphate has been used.

Section 7.

The complete analysis of representatives oils from different parts of the province has been continued. 70 samples have been collected and the analysis nearly completed. The change of laboratories has interfered with the work since last July. Detailed results on those completed will not be reported on at present. The general conclusions from this work further emphasize the deficiency of our soils in lime and organic matter, the abundance of *total* potash and the prevailing acid condition of the soil.

The place of soil analysis is indicated in the following circular letter sent out to those sending samples.

Soil Analysis.

Interest in the crude material used in an industry is a guide to the intelligence shown in the conduct of that business; interest usually results in more complete knowledge; this, in turn, to better returns for work done.

Many letters are received by this department regarding the chemical analysis of soils. The following is a fair sample:

Gentlemen:

Would you kindly give me an analysis of this earth? Would you advise me if it would be suitable for growing grass and potatoes, and what treatment? Which would be the more profitable crop? What kind of commercial fertilizer would be best to put on?

The information usually sought is:

1. What crop is adapted to this soil?
2. What fertilizer is needed?

Chemical analysis shows the amounts of the various elements of plant food present in the soil; this is only one factor to be considered in judging a soil.

Crop adaption depends more upon the proportion of gravel, sand and clay than upon chemical composition. Emphasis will be put upon the physical analysis, which gives the amounts of clay, sand, etc of the whole soil. Chemical analysis usually deals only with the soluble part of the soil and reveals the *actual* amounts of various elements.

One crop may be better able than another to obtain potash from a soil; so that, the usable plant food depends on the fineness of the soil, the kind of crop and amount of water in the soil. We wish to encourage the study of soils and shall, under certain conditions, be ready to analyze, if the information so obtained will be of general interest. Chemical analysis is a slow, expensive process, the results of which must be used along with crop returns, soil treatment etc.

In order to decide whether an analysis of a given soil is necessary, correspondents are advised to send about half a cupful of the soil for a preliminary study.

Directions for Taking Sample.

Dig and clean out several holes about 8 inches square in different parts of the field, to a depth shown by a change of color in the soil, or to a depth turned in plowing, not over seven inches; then slice down to the thickness of one inch on one side of each hole; take out and mix the slices on a sheet of paper. Send a sample from this mixture

Every sample sent should be accompanied by full information along the following lines:

1. How deep was sample taken?
2. What kind of subsoil.
3. Drainage, slope of land.
4. Most common trees or plants if uncultivated soil.
5. If "worn out" field, what grasses?
6. What weeds flourish?

In case of doubt about the name of plants send small specimens.

7. Give information for as many years as possible about

    (a) Manures or fertilizers used.
    (b) About crops grown.

8. Has lime been applied? Does clover thrive?

If a preliminary examination of the small sample warrants a further study, a large sample taken in the same way will be asked for.

No returns from a full chemical analysis need be expected in less than a month.

Address sample and correspondence

L. C. HARLOW.
Agricultural College, Truro.

Group 8.

21 samples of vegetable soils have been examined These are classed as *peaty*, *peaty-loam* and *muck*; peaty if they have over twenty-five per cent. organic matter; peaty-loam if 10-25 per cent. organic matter and equal parts of clay and sand; muck, if 10-25 per cent. organic matter with the rest nearly all clay. Probably more questions are asked this department and more samples sent of this type of soil than any other. Very wide variations in the humus content of these occur.

The following analysis will give an idea of the composition of these soils:—

	I %	II %	III %	IV %	V %
Water	6.25	8.75	14.80	12.6	6.25
Organic Matter	38.35	89.00	57.55	59.85	7.65
Potash	.098	.04	.22	.13	.66
Phos. Acid	.64	.224	.002	1.57	.25
Lime	1.8	.20	3.9	3.4	1.4
Magnesia	.46	.4	.4	.11	.79
Soda	1	.1	.26	.29	1.48
Sulphuric Acid	.22	.17	.03	.56	.36
Iron and alumina	3.5	.37	9.2	11.87	17.00
Insoluble	48.4	1.5	11.59	8.47	65.55
Nitrogen	.82	1.06	......	1.8	.....

No. I is a peaty soil from Maitland, Hants Co.
No. II is a peaty soil from Milford, Hants Co.
No. III and IV are peaty soils from Kings Co.
No. V is a brown soil from Inverness Co.

These are all dark colored soils such as would be called vegetable soils; note the wide variations in the phosphoric acid, the mineral or insoluble part and the uniformly low potash, and the high percentage of lime.

Chemical analysis is of value in determining the compositions of such soils.

A soil such as II will not grow crops continuously as there is not sufficient mineral matter. Such material will be efficient as an absorbent of liquid manure and will when added as a part of stable manure, add humus to a poor soil.

Numbers I, III, and IV should, if drained and supplied with potash in all cases and phosphoric acid in III, give good yields of corn, oats and wheat.

The importance of these soils seems to be emphasized by the use of humogen or bacterized peat, an artificial material prepared in the laboratory of Professor Bottomley. London, Eng, bythe action on peat of bacteria of certain kinds.

Much interest is aroused in the results which are claimed for it.

Experimental.

Sandy Soil.—In April 1915 a beginning was made in the pot method of testing soils.

Galvanized iron boxes 10″ by 12″ by 12″ deep with a drainage hole were coated with paraffin wax. Drainage material to the depth of two inches was placed in the boxes.

One series was conducted with a red sandstone subsoil with the following analysis:—

Nitrogen .01 per cent., potash .28 per cent, phosphoric acid. 28 per cent and lime .15 per cent.

The use of the ground limestone was emphasized in this case.

Nitrate of soda was used at the rate of 150 lbs. per acre or its equivalent 132 lbs. of sulphate of ammonia; 280 lbs. of acid phosphate or its equivalent of basic slag, 120 lbs. of muriate of potash or 30 tons of stable manure per acre were applied.

Wheat was sown Apr. 13th and harvested Aug. 5th; for this preliminary experiment only the total air dried matter above the level of the ground was recorded as follows:—

Plot No.		Grams	=	Tons per Acre
1.	Blank	23	=	1.6
2.	Limestone 2 tons per acre	22.5	=	1.55
3.	Limestone 6 ton " "	37.5	=	2.25
4.	Limestone fine powder 2 ton and nitrate of soda	39.	=	2.4
5.	Limestone pieces size of wheat grains	15.	=	.9
6.	Limestone 6 tons plus nitrate of soda, acid phosphate, muriate of potash	41.	=	2.5
7.	Same but sulphate of ammonia in place of nitrate of soda	38.	=	2.28
9.	Limestone 6 ton, nitrate of soda, slag and muriate of potash	43.	=	2.6
10.	Stable manure	40.	=	2.4
11.	Stable manure plus 6 ton per acre	51.5	=	3.1
12.	Nitrate of soda acid phosphate muriate of potash	42.	=	2.55
13.	Burnt lime 2 ton nitrate of soda acid phosphate muriate of potash	34.	=	2.
14.	Same but ground gypsum 2 ton, replacing the lime	36.5	=	2.2

Note the following; (1) The gain when limestone is added to stable manure; this seems to give the best yield on such a soil.

(2) The importance of fineness of particle for quick returns, see numbers 4 and 5.

(3) The small gain for limestone and commercial fertilizer over commercial fertilizer only; it is to be noted that limestone is slow in its action, and of especial value to *certain crops as clover*, as shown on the farm plots. These boxes are now planted with clover for further experiment.

Peaty Soil.

A second series was conducted using a peaty soil with 85 per cent. organic matter, .09 per cent. potash, .09 per cent phosphoric acid and 1.58 per cent nitrogen.

		Grams.		Tons per Acre.
1.	Blank	58.	=	3.5
2.	Potash and acid phosphate	62.	=	3.7
3.	Potash (muriate)	78.	=	4.7
4.	Acid phosphate	70.	=	4.2
5.	Limestone 6 ton nitrate of soda acid phosphate muriate of potash	84.	=	5.1
6.	Nitrate of soda acid phosphate muriate of potash	53.	=	3.18
7.	Limestone 4 ton per acre	45.5	=	2.7

This series shows that potash is the much needed element; that potash and limestone together might be a good addition; that the use of limestone alone seems to be of no value on peaty soils.

L. C. HARLOW.

PART 9—WOMEN'S INSTITUTES.

Professor M. Cumming,
Truro, N.S.

Dear Sir:—I have much pleasure in placing before you the Third Annual Report of the Women's Institutes of Nova Scotia.

In doing so I think I can safely make the statement that the place of the Institutes in the lives of the women of Nova Scotia is an assured one and that the Institute is, today, one of the most, if not the most representative society of Nova Scotia. The work of the Institutes has been on the broad lines of achievement for the benefit of all and I hear, on all sides, much favorable comment on the local improvements carried out successfully by the Institute. The schools of the province have been taken under consideration and many of them hitherto showing an air of general neglect have been improved both as to interior and exterior and needed sanitary regulations inttroduced. Other local interests have been assisted and in many places it has come to be regarded as the proper thing to do, when any needed reform is discussed, to place the matter in the hands of the Women's Institute and await the successful results.

The bulk of the time and energy of the members has been devoted to assisting the many causes that have arisen out of the war, and their efforts are altogether worthy of praise. For Red Cross, British Red Cross and Patriotic purposes the splendid sum of $7970.32 has been donated; for Belgian Relief $692.67 and for Red Cross and Belgian Relief 162 large boxes were packed and forwarded for shipment. Several of our Institutes, to avoid confliction, work, in co-operation with or through other societies for Red Cross so that the work has been well and faithfully carried on. Twenty-three of the Institutes donated a McLaughlin-Buick Motor Ambulance at a cost of $1540.00 to the Provincial Red Cross.

Personally I held fifty-two meetings from the first of June until the end of November; nineteen were visits paid to organized Institutes; five were addresses to other societies on the aim of Women's Institutes and twenty-seven were organization meetings held with the assistance of Miss Grace Dutcher of Charlottetown and Miss Agnes McGuire of Lunenburg. Miss McGuire also held fifteen meetings for organization purposes. Last year we had thirty-six Institutes; seven of these dropped out and this year fifteen

Third Annual Convention of Women's Institutes at Agricultural College, Truro, January, 1916.
Picture taken at Main Entrance to Science Building.

were added and the number now stands at forty-four distributed as regards counties as follows:—Pictou, 2; Colchester 1; Cumberland 3; Hants 3; Kings 5; Annapolis 2; Digby 4; Yarmouth 4; Lunenburg 7; Queens 3; Halifax 1; Guysboro 4; Antigonish 1; Cape Breton Island 4. The total membership is 1383.

Seventeen Institutes availed themselves of the offer of a free library from the Travelling Library scheme of McGill University, and found the books of great benefit. We have renewed the offer for the coming year.

Miss Annie Redmond of Dartmouth gave a series of demonstrations to several of the Institutes which were highly successful. These demonstrations meet with so much interest from the members of the Institutes that I hope shortly to place before you for your approval, a series of demonstrations, for the coming summer, on a much more elaborate scale than anything attempted hitherto.

During the autumn I judged at nine exhibitions and Miss Redmond was procured for two. I owe a debt of gratitude to the various Exhibition Commissions for the kindly manner in which they have met every suggestion on my part for alterations in the Domestic Department of the Exhibition Prize Lists.

I speak of all the Institutes when I say that we are deeply grateful for the splendid quarters in the new Science Building, especially for the commodious and up-to-date Household Science Class rooms and we feel that the courses conducted in the future will be productive of much good.

Respectfully submitted.

JENNIE A. FRASER.

PART II.

Prof. M. Cumming,
Secretary for Agriculture,
Truro, Nova Scotia.

Sir:—

In submitting my ninth annual report in connection with the management of Agricultural Societies, I am pleased to be in a position to state that the year just closed has been the most successful in the history of Agricultural Societies.

Of the two hundred and twenty-six Societies qualifying for the grant last year, four failed to qualify. There are twenty-one new ones formed and four resusictated, making a gain of twenty-one, and a total of two hundred and forty-seven Societies in the Province qualifying for the grant in 1916.

This is the largest number of Societies in the history of the Province and the largest gain in any one year since 1884.

It will also be noted that the membership increased by 636 and the amount subscribed was $1907.70 larger than last year.

These figures, however, do not adequately represent the year's progress. Agricultural Societles are becoming more exacting regarding the quality of the sires used each year and are willing to pay good prices for sires backed by records. They are also realizing more than ever the advantage of using sires of proven merit and the last year has witnessed a large number of sales and exchanges of aged bulls. The practice of bonusing Agricultural Societies for constructing "paddocks," for exercising bulls is a vast influence for improvement. The system of making grants to unfortunate societies is very popular and often tides a society over a critical period which would otherwise drop out of the race. I feel sure that this practice alone is responsible for a large percentage of the increase.

During the year I have had the pleasure of visiting a large number of Societies, especially in the Eastern parts of the Province. It is a pleasure to note the increased interest among the members of the majority of societies and the pride with which keepers of animals in many instances will call your attention to the good qualities of sires owned by their Societies.

The most encouraging feature and strongest argument in favor of continued improvement in Live Stock is the wide spread public demand for better sires.

Respectfully submitted,

F. L. FULLER.

Previous Record of Agricultural Societies in Nova Scotia.

The fluctuation in the numbers and strength of Agricultural Societies in the Province during the last fifty two years is shown in the following table, from which it will be seen that the number of Societies has been increased from the original number of thirty-seven to two hundred and forty-seven, membership from 1,744 to 10,315; subscriptions from $1,859.90 to $19,788.81; and grants in aid from $3,010 to $15,000.00.

Comparative Statement showing the number and strength of Agricultural Societies organized under the Act for Encouragement of Agriculture in each year, for fifty-two years from 1864 *to* 1915 *both inclusive.*

YEAR			No. of Soc.	No. of Memb's	Amount of Subscription	Grants in Aid
1st	Year	1864	37	1744	$1859 90	$3010 00
11th	"	1874	64	3971	4495 00	5830 50
21st	"	1884	92	5064	6361 59	6835 00
22nd	"	1885	88	4592	5225 00	6556 50
23rd	"	1886	91	4532	5334 90	6653 00
24th	"	1887	85	4432	1571 85	6597 00
25th	"	1888	83	3986	4659 47	6361 00
26th	"	1889	82	4398	5170 10	6444 00
27th	"	1890	81	4152	5257 45	6420 00
28th	"	1891	81	4136	5172 29	6432 20
29th	"	1892	80	4273	5856 53	6525 00
30th	"	1893	81	4068	5051 55	6309 50
31st	"	1894	80	4398	4424 55	8000 00
32nd	"	1895	83	4597	5356 15	8000 00
33rd	"	1896	85	4888	5657 30	8000 00
34th	"	1897	89	5238	5997 16	8000 00
35th	"	1898	103	6155	7092 90	8000 00
36th	"	1899	119	6974	8502 45	10000 00
37th	"	1900	131	7362	9322 60	10000 00
38th	"	1901	151	8500	10771 53	10000 00
39th	"	1902	163	8973	11688 43	10000 00
40th	"	1903	172	9444	13209 65	10000 00
41st	"	1904	166	8426	11634 80	10000 00
42nd	"	1905	164	8398	11888 90	10000 00
43rd	"	1906	166	8498	12900 51	10000 00
44th	"	1907	160	7849	15015 40	10000 00
45th	"	1908	167	7596	11284 77	10000 00
46th	"	1909	179	8090	12158 95	10000 00
47th	"	1910	187	8315	12732 45	10000 00
48th	"	1911	200	8567	13137 45	10000 00
49th	"	1912	205	8503	13256 73	10000 00
50th	"	1913	219	9248	16799 03	15000 00
51st	"	1914	226	9769	17869 11	15000 00
52nd	"	1915	247	10315	19788 81	15000 00

STATEMENT OF SOCIETIES FOR 1915.

There are two hundred and forty-seven Agricultural Societies in the Province which have qualified for participation in the grant for 1916. Four of the Societies reported last year have failed to qualify and twenty-one new societies have been added and four resuscitated.

The following list shows total number of members of the Societies of each County, the total amount of subscriptions duly declared to, according to the provisions of the Act, as paid by the members within the year, and the total amount of grant qualified for by the several Counties.

COUNTRIES	No. of Societies 1915.	Number of Members	Total Amount Subscription	Total Amount Grant in Aid
Annapolis..........	22	809	$ 1996 75	$ 1349 12
Antigonish..........	27	763	1865 92	1410 14
Cape Breton	11	346	816 50	598 18
Colchester..........	21	842	1573 50	1148 20
Cumberland........	15	600	1262 35	878 26
Digby..............	6	471	633 90	405 47
Guysboro..........	10	397	575 60	473 77
Halifax............	7	262	512 75	377 78
Hants..............	14	544	1287 50	865 62
Inverness..........	19	835	1506 35	1073 55
Kings..............	12	541	1340 72	841 57
Lunenburg..........	22	1281	1808 30	1269 98
Pictou.............	30	910	1850 60	1473 28
Queens.............	5	179	327 32	253 46
Richmond..........	11	522	745 00	586 12
Shelburne..........	3	210	232 25	167 14
Victoria...........	7	217	396 00	328 73
Yarmouth..........	5	586	1045 50	517 63
	247	10315	$19788 81	$14000 00

LIST *of Agricultural Societies organized under the Acts for Encouragement of Agriculture with* (1) *names of principal officers*; (2) *number of members*; (3) *amount of subscriptions officially declared to in the terms of the Acts as paid*

ANNAPOLIS COUNTY.

Annapolis Royal.—President, Rev. H. Howe, Annapolis Royal; Vice-President, R. H. Hardwick, Annapolis Royal; Secy.-Treasurer, Geo. L. Cain, Annapolis Royal; Directors: J. G. Cameron, F. A. Chipman, A. J. Willis, F. J. Balcom, W. A. Marshall, Annapolis Royal; Auditors: A. H. Harris, Fred Goucher, Annapolis Royal........................

Brooklyn.—President, Capt. G. A. Morris, R. R. 1, Middleton; Secy.-Treasurer, C. E. Wright, R. R. No. 1, Middleton; Directors: Melbourne Whitman, P. F. Young, C. A. Neily, J. O. Stevenson, L. P. Bruce, R. R. No. 1, Middleton; Auditors: P F. Young, L. P. Bruce..........

Clarence.—President, A. P. Rumsey, Clarence; Vice-President, V. B. Leonard, Clarence; Secy.-Treasurer, A. J. Wilson, Clarence; Directors: Avard Jackson, Stewart Leonard, C. H. Jackson, A. C. Chute, Eldon Marshall, Albert Banks, J. W. Elliott, Clarence.........................

Clementsvale.—President, Albert Brown, Clementsvale; Vice-President, James H. Robinson, Clementsvale; Secy.-Treasurer, Leslie Baird, Clementsvale, Directors: Ed. Potter, Reginald I. Baird, Asa Potter, Ralph N. Potter, Harry Potter, Clementsvale; Auditors: James H. Robinson, Chas. W. Trimper, Clementsvale.....................

Cleveland.—President, Major D. G. Ritcey, Nictaux Falls; Vice-President, C. W. Hoffman, Nictaux Falls; Secy.-Treasurer, Arch. Feindel, Nixtaux Falls; Directors: George Heatly, Nixtaux South; J. S. North, A. B. Barteaux, C. C. Smith, G. C. Whitman, Nictaux Falls; Auditors; A. B. Barteaux, G. C. Whitman.........................

Falkland Ridge.—President, Geo. Roop, Falkland Ridge; Vice-President, Robert Swallow, Falkland Ridge; Secy., C. R. Marshall, R. R. Springfield; Treasurer, W. L. Sproule, Falkland Ridge; Directors: Emerson Wagner, Harry Whynot, Hiram Sproule, Percy Starratt, Dennis Wagner, Falkland Ridge; Auditors: E. Wagner, R. Swallow........

for 1915; *and* (4) *total receipts, total expenditure,* (*c*) *balance in hand,* (*d*) *deficit;* (5) *amount of grant apportioned to each society for* 1916, *subject to compliance in other respects with the requirements of the Act.*

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
27	44 00	41 69	141 92	96 50	45 42
28	40 00	40 00	222 41	216 50	5 91
65	155 25	88 43	331 52	370 40	38 89
48	78 00	55 95	157 42	92 72	64 70
19	78 25	56 05	192 62	200 66	8 04
30	65 50	50 72	220 88	138 03	82 85

Forest Glade.—President, P. D. Bent, Forest Glade; Vice-President, F. Forsyth, Margaretville; Secy.-Treasurer, D. A. Downing, Margaretville; Directors: A. D. Gates, Jos. Gates, Forest Glade; John Hudgins, R. Stronach, Margaretville, Alva Thorne, Prince Albert; Auditors: A. D. Gates, Jos. Gates..

Granville Centre.—President, I. Norman Wade, Granville Centre; Vice-President, Harry Goodwin, Belleisle; Secy.-Treasurer, Frank R. Troop, Granville Centre; Directors: I. Reid Willett, Henry F. Troop, John McCormick, David Gilliatt, Geo. M. Bent, Granville Centre; Auditors: I. Norman Wade, Harry Goodwin.........................

Laurie.—President, Geo. A. Bolser, Spa Springs; Vice-President, J. S. Marshall, Spa Springs; Secy.-Treasurer, A. F. Gordon, Spa Springs; Directors: J. A. Woodbury, L. R. Archibald, F. A. Bolser, C. W. Daniels, A. F. Gordon, Spa Springs......................................

Mount Hanley.—President, E. J. Elliott, Mt. Hanley; Vice-President, Frank Crawford, Douglasville; Secy.-Treasurer, A. W. Slocomb, Mt. Hanley; Directors: Geo. Douglas, H. Daniels, Douglasville; Edward Pierce, L. Hines, Caleb Slocomb, Mt. Hanley; Auditors: Stanley Barteaux, Ross Miller, Mt. Hanley..............................

Nictaux.—President, F. M. Chipman, Nixtaux West; Vice-President, G. D. Morse, Nictaux West; Secty.-Treasurer, N. M. Beckwith, Middleton; Directors: F. B. Morse, Willard Ruggles, A. L. Neily, W. W. Crawford, Nictaux West; N. M. Beckwith, Middleton; Auditors: Elias Barteaux, C. S. Rogers..............................

Paradise.—President, J. S. Longley, Paradise; Vice-President, F. W. Bishop, Paradise; Secy.-Treasurer, R. S. Leonard, Paradise; Directors: J. C. Phinney, A. W. Phinney, J. E. Lillie, J. S. Ritcey, L. H. Balcom, Paradise; Auditors: H. A. Longley, L. H. Balcom, Paradise..................

Riverview.—President, H. C. Marshall, R. F. D. No. 1, Lawrencetown, Vice-President, W. E. Illsley, R. F. D. No. 1, Lawrencetown, Secty.-Treasurer, Robt. L. Moore, R. F. D. No. 1, Lawrencetown: Directors: H. J. Messenger, T. R. Charlton, R. F. D. No. 1 Lawrencetown; D. M. Charlton, H. Boland, A. C. Stevenson, R. F. D. No. 1, Lawrencetown;

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
68	237 00	122 75	479 07	462 15	16 92
34	175 00	96 72	296 99	247 02	49 97
65	153 00	88 47	270 73	246 85	23 88
42	55 25	46 40	128 19	95 00	33 19
31	62 00	49 25	401 98	203 30	198 68
34	89 25	60 69	596 81	548 50	48 31
38	74 75	54 60	344 90	330 54	14 36

Springfield.—President, J. C. Roop, Springfield; Vice-President, Johnson Crouse, Springfield, Secy., Irving Mason, Springfield; Treasurer, W. M. Durling, Springfield; Directors: G. A. Durling, J. E. Morrison, Wm. Roop, C. A. Grimm Donald Morrison, Springfield; Auditors: E. C. Durling, Springfield...

Stoney Beach.—President, S. E. Thorne, Granville Ferry; Vice-President, H. Winchester, Lower Granville; Secy.-Treasurer, W. B. Winchester, Granville Ferry; Directors: E. A. Fitch, E. D. Farnsworth, Ansel Orde, Rupert Farnsworth, G. P. Littlewood, Lower Granville; Auditors: Holland Snow, N. G. Thacker, Lower Granville...........

Torbrook.—President, H. P. Wheelock, Torbrook West, Vice.-President, J. L. Brown, Torbrook; Secy.-Treasurer, A. Stanley Brown, Torbrook; Directors: J. W. Jefferson, I. J. Whitman, Martin Uhlman, Arthur Jefferson, Torbrook; Judson Armstrong, Torbrook Mines; Auditors: Arthur Jefferson, Judson Armstrong..........................

Tupperville.—President, Howard Bent, Tupperville; Vice-President, S. Bent, Tupperville; Secy., C. R. Bent, Tupperville; Directors: W. R. Inglis, F. V. Bent, P. C. Inglis, S. Kent, L. W. Chipman, Tupperville.; Auditors: H. E. Bent, F. H. Willett, Tupperville.............................

Union.—President, R. Van Ditmars, Deep Brook; Vice-President, J. F. McLellan, Deep Brook; Secy.-Treasurer, Robt. Spurr, Deep Brook, Directors: Walter Purdy, E. R. Pinkney, Frank Ruggles, J. R. Berry, J. M. Nichols, Deep Brook; Auditors: J. M. Nichols, Walter Purdy...........

Upper Granville.—President, Frank H. Bath, Upper Granville; Vice-President, W. A. Horton, Upper Granville; Secy.-Treasurer, R. F. Parker, Upper Granville; Directors: John F. Bath, A. E. Phinney, L. P. Whitman, J. G. Cuthbertson, J. B. Gillis, Upper Granville; Auditors: A. C. Clarke, S. K. Mack, Upper Granville.....................

Wilmot Mountain.—President, William Grant, Port Lorne; Vice-President, William Hall, St. Croix Cove; Secy.-Treas., Fred R. Stark, St. Croix Cove; Directors: Eber Brinton, St. Croix Cove; Jos. Hall, St. Croix Cove; Reise Foster, Port Lorne; Adelbert Johnson, Ritson Bent, Mount Rose...

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
38	100 00	65 20	237 55	357 50	19 95
22	50 00	44 20	277 53	199 63	77 90
16	40 00	40 00	131 50	90 16	41 43
15	45 00	42 10	New	Society	
59	142 00	82 85	360 76	278 87	81 89
15	111 00	69 82	New	Society	
40	47 50	43 15	223 81	83 41	140 40

Wilmot.—President, N. P. Wood, Wilmot; Vice-President, J. L. Van Buskirk, Wilmot; Secy.-Treasurer; S. A. Patterson, Wilmot; Directors: A. P. Bowlby, G. A. Wotton, Isaiah Bruce, J. P. Kelsall, Louis Wotton, Wilmot; Auditors: H. R. Pierce, Neil Bowlby, Wilmot....................

Williamston.—President, Harry Barteaux, South Williamston; Vice-President; A. F. Morse, Williamston; Secy-Treasurer; B. M. Shankel, South Williamston; Directors: E. C. Shaffner, Williamston, A. H. Bishop, Williamston; F. A. Randolph, Williamston; J. L. Shaffner, Williamston; W. A. Hunt, Williamston, Auditor; F. A. Randolph...........

ANTIGONISH COUNTY.

Antigonish.—President, Thomas McAmis, Antigonish; Vice-President; James Thompson, Cloverville; Secy-Treasurer; J. C. McNaughton, Box 135, Antigonish; Directors: Sheriff Chisholm, Antigonish; J. G. Taylor, Antigonish; W. R. Crocket, Antigonish; John P. McNeil, Lanark; F. R. Trotter, Antigonish.........................

Antigonish Harbor —President, John P. Grant; Antionish Harbor; Secy., Thomas Hogan, Harbor Road; Directors: John W. Chisholm, Antigonish Harbor, Thomas Hogan, Harbor Road; Hugh McNeil, Antigonish Harbor...

Arisaig.—President, Alex. J. McDonald, Arisaig; Vice-President, Alex. G. McDonald, Arisaig; Secy., L. A. Gillis, Arisaig; Directors: Ronald McDonald, Arisaig; Joseph A. Smith, Arisaig; Alex. Gillis, Arisaig; Dan H. McDonald, Arisaig..................................

Beaver Meadow.—President, John R. McDonald, James River Station; Vice-President, Duncan McIsaac, James River Station; Secy-Treasurer, Alex. J. McDonald, James River Station; Directors: William H McDonald, Beaver Meadow; Peter McDonald, James River Station; Duncan McIsaac, James River; Henry P Baxter, Addington Forks; William MacDonald, James River Station; Auditors: John J Chisholm, Briely Brook; Peter McDonald, James River Station ....

Black Avon —President, Donald McDonald, Heatherton; Vice-President, John D McDonald, Heatherton; Secy., Alex. A. McDonald, Heatherton; Directors: John Mills, Heatherton; L. R. McDonald, Heatherton; Dan Kennedy, Black Avon; Stephen McNeil, Heatherton; Wm. McMillan, Black Avon..........................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
32	71 75	53 34	148 20	116 07	32 13
33	82 25	57 74	198 70	165 85	32 85
62	91 00	61 43	262 95	156 30	106 65
24	49 00	43 78	98 62	103 64	5 02
17	43 10	41 30	241 15	211 55	29 60
40	69 00	52 18	199 63	143 40	56 23
19	95 00	63 12	New	Society	

Clydesdale.—President, Ronald McDonald, Antigonish; Vice-President, John A. Chisholm, Antigonish; Secy.-Treasurer, Wm. J. Chisholm, Antigonish; Directors: John Chisholm, Clydesdale; Adam Kirk, Clydesdale; Dan Connors, Clydesdale; Alex. McDonald, Clydesdale; John W. McDonald, Clydesdale; Auditors: Harry Eadie, Clydesdale; John W. McDonald, Clydesdale........................

Fairmont.—President, W. J. Walsh, Fairmont; Vice-President, John MacNeil, Fairmont; Secy-Treasurer; Alex. McPherson, Cloverville; Directors: Thomas Brophy, Brophy's Post Office, John A. McPherson, Fairmont; Allan Cameron, Fairmont; Alex. McPherson, Cloverville; P. J. Hanaran, Fairmont; Auditors: Dan Cameron, Fairmont; P. D. Hanaran, Fairmont..........................

Fraser's Grant.—President, Ronald A. McDonald, Fraser's Grant; Vice-President, Rod J. McDonald, Fraser's Grant: Secy.-Treasurer, John A. McIntyre, Fraser's Grant; Directors: Dan J. McDonald, Fraser's Grant; Alex. S. McDonald, Fraser's Grant; Alex. McPhail, Fraser's Grant, William H. Rogers, Charlie Perro, Fraser's Grant......................................

Georgeville.—President, D. A. McInnis, Georgeville; Vice-President, Rod McDougall, Georgeville; Secy.-Treasurer, John D. McGillivray, Georgeville, Directors: Rev. M. Gillis, Georgeville, Dan Fraser, Angus Gillis, Georgeville, John A. Gillis, Georgeville, John D. McDougall, Rear Georgeville; Auditors: Rev. M. Gillis, Georgeville, Dan A. McInnis, Georgeville...........................

Glassburn.—President, James Grant, Glassburn; Vice-President, William Chisholm, Heatherton; Secy., Duncan Chisholm, Glassburn; Directors: John W. Chisholm, Glassburn, John B. McDonald, Glassburn; Archibald Chisholm, Glassburn, Alex. J. Chisholm, Glassburn: Auditors: John Joseph Chisholm, John W. Chisholm, Glassburn...........

Harbor Au Boucher.—President, David Benoit, East Harbor Au Boucher; Vice-President, Allan Anderson, East Harbor Au Boucher; Secy.-Treasurer, Lucius De Coste, Cape Jack; Directors: Chas. Bouche, E. Harbor Boucher, J. T. Crispo, Harbor Au Boucher, Moses Braw, Cape Jack, Edmund Levangie, Harbor Au Boucher; W. W. Webb, Harbor Au Boucher; Auditors: J. T. Crispo, Harbor Au Boucher; W. W. Webb, Harbor Au Boucher..............

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Total
17	47 00	42 93	121 87	102 50	19 37
23	40 00	40 00	153 12	81 52	71 60
24	48 50	43 57	130 70	100 23	30 47
19	89 50	60 79	223 85	199 27	24 58
31	197 25	106 60	489 15	242 60	246 55
44	80 00	56 81	162 24	82 85	79 39

Lakevale.—President, Duncan C. McNeil, Lakevale; Vice-President, John C. McGillivray, West Lakevale; Secy. Rev. Donald Beaton, Lakevale; Directors: Dougald McDonald, Morris Town, Angus McNeil, Morris Town; John H. Boyd, West Lakevale, John A. Boyd, Daniel Wallace, West Lakevale; Auditors: John A. McDougall, Lakevale, Dan McGillivray, Lakevale..................

Lochaber.—President, John O'Leary, Lochaber; Vice-President, James D. Stewart, Middleton; Secy.-Treasurer, John Brown, West Lochaber; Directors: Hugh McInnes, Lochaber, Wm. McDonald, South Lochaber; Arthur Sutherland, Copper Lake; George Inglis, North Lochaber; Garfield McDonald, Middleton; Auditors: John O'Leary, Lochaber, John McDonald, South Lochaber...............

Malignant Cove.—President, D. R. McDonald, Malignant Cove; Vice-President, A. R. McAdam, Malignant Cove Secy.-Treasurer, M. D. McDonald, Malignant Cove; Directors: John Chisholm, D. M. McDonald, A. McGillivray, A. R. McAdam, Hector McNeil, Malignant Cove; Auditors: John D. Chisholm, D. McDonald, Malignant Cove.........

Maryvale.—President, R. H. McGillivray, Lennox; Vice-President, A. A. McDougall, Maryvale; Sec.-Treasurer, R. A. McDonald, Lennox; Directors: J. A. McDonald, Maryvale; R. A. McGillivray, Lennox, Allan McDonald, Maryvale, A. H. McDonald, Maryvale; Alex. A. McDonald, Maryvale; Auditors: Ronald McDonald, R. J. McDonald...

Morar.—President, Angus Brown, Livingstone Cove; Vice-President, John J. McPherson, Livingstone Cove; Secy.-Treasurer, Alexander J. Gillis, Morar; Directors: John McMillan, Livingstone Cove; Daniel McPherson, Morar; William McEachern, Livingstone Cove.....................

McAra's Brook.—President, William McGillivray, McAra's Brook; Vice-President, J. D. McPherson, McAra's Brook; Secy.-Treasurer, J. W. McAdam, McAra's Brook; Directors: J. R. McAdam, John A. McPherson, McAra's Brook; John D. McLeod, Knoydart; John H. McEachern, McAra's Brook; Auditors: Angus McDougald, Knoydart; C. J. McDonald, Knoydart...........................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
21	47 00	42 93	214 99	172 99	42 00
52	78 00	55 97	292 89	396 33	103 44
21	45 00	42 09	87 88	87 88	
16	42 50	41 04	140 80	165 00	24 20
25	42 10	40 80	121 57	125 75	5 82
17	43 55	41 48	187 05	166 55	20 50

North Grant —President, Geo. Sutton, Antigonish; Secy.-Treasurer, W. A. Chisholm, Box 404, Antigonish; Directors: Ronald Chisholm, Briley Brook, Laughlin McLellen, North Grant; Alex. Chisholm, North Grant; Angus McDonald, North Grant; Auditors: R. Chisholm, Briley Brook, Geo. Sutton, North Grant........................

Pleasant Valley.—President, Alex. F. McGillivray, Pleasant Valley; Vice-President, Angus D. McGillivray, Pleasant Valley; Secy.-Treasurer, R. McDonald, Pleasant Valley; Directors: John D. McDonald, Doug. J. McGillivray, George Baxter, Joseph Purcell, Ronald Smith, Pleasant Valley; Auditors: John D. McDonald, Vincent Purcell, Valley..

Pomquet —President, Edmund Doiron, Pompuet; Vice-President, Nicholas Doiron, Pomquet; Secy.-Treasurer, Edward A. Doiron, Pomquet; Directors: Joseph Benoit, Pomquet Station; Henry G. Landry, Pomquet; Xavier Doiron, Monk's Head; James Landry, Pomquet; Alex. R. Landry, Pomquet; Auditors: Wallace Doiron, Pomquet; Joseph A. Boudreau, Pomquet.........................

St. Andrews.—President, John Dan Chisholm, Marydale; Vice-President, Arch A. Chisholm, Pomquet River; Secy.-Treasurer, Rev. A. J. Chisholm, St. Andrews; Directors: Allan McDonald, St. Andrews; Dr. Don A. McIsaac, Dunmore; John C. Chisholm, St. Andrews, Don A. Boyd, St. Andrews; Alex. McDonald, McPherson's P. O., Robert Chisholm, St. Andrews; Auditors: Don A. Boyd, St. Andrews, Arch A. Chisholm, Pomquet River................

South River.—President, L. Gillis, Upper South River; Vice-President, D. H. McPherson, Fraser's Mills; Secy.-Treasurer, Dan. D. McGillivray, McPherson's; Directors: Andrew McDonald, Fraser's Mills; D. W. Chisholm, McPherson's; John D. Cameron, McPherson's; A. J. McDonnell, M. Sinclair, Fraser's Mills; Auditors: D. J. McDonald, D. R. McDonnell, Fraser's Mills....................

South River and Loch Katrine.—President, J. S. McMillan, Upper South River; Vice-President., J. A. McMillan, Upper South River; Secy.-Treas, J. A. Cameron, Loch Katrine; Directors: A. D. McIntosh, Loch Katrine; J. H. Kennedy, Loch Katrine; Wentworth Taylor, A. A. McDonald, A. H. McPherson, Upper South River.........

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
30	47 00	42 93	143 45	80 10	63 35
26	43 00	41 26	88 13	67 86	20 27
43	180 17	98 91	New	Society	
28	60 75	48 72	105 45	143 00	37 55
30	76 00	55 12	236 43	144 43	92 00
22	66 00	50 92	185 32	147 35	37 97

South Side Cape George.—President, James F. McEachern, Ballentyne Cove; Vice-President, Duncan Gillis, Cape George; Secy.-Treasurer, John M. McEachern, Cape George; Directors: William McPhie, Cape George; Alex. McInnis, Ballentyne Cove; Colin McDonald, Ballentyne; Wm. McInnis, Dan J. McEachern, Cape George..........

South Side Harbor.—President, Roderick Fraser, S. S. Harbor; Vice-President, Ronald Cameron, Lower South River; Secy.-Treasurer, Allan McDonald, South River Station; Directors: Donald McDonald, Colin Chisholm, J. C. Crosby, W. R. Chisholm, R. McDonald, South Side Harbor; Auditors: Rod H. Chisholm, South Side Harbor; Alex. Cameron, Lower South River..........................

Tracadie.—President, John F. McKeough, Afton Station Vice-President, Moses Delorey, Big Tracadie; Secy.-Treasurer, W. H. Delorey, Tracadie; Directors: Jos. McKeough, Afton Station; Joseph Landry, Tracadie; Wm. Riley, Bayfield; Ambrose Connors, Bayfield, Jos. Girroir, Big Tracadie.

West River.—President, Dan J. McDonald, Purl Brook; Vice-President, Alex. Kennedy, Purl Brook; Secy-Treasurer, Ronald C. McGillivray, Glen Road; Directors: Angus D. McDonald, Purl Brook, Alex, Kennedy Alex. Kirk, Donald McLean, Purl Brook; Wm. J. Chisholm, Glen Road; Auditors: Thomas Ethridge, Alex. Kirk, Purl Brook..........

CAPE BRETON COUNTY.

Edwardsville.—President, Thomas H. Rudderham, Edwardsville; Vice-President, Robt. Lewis, Edwardsville; Secy.-Treasurer, James Keating, Edwardsville; Directors: Ernest Fraser, Edwardsville, Wallace Lewis, Pt. Edward; J. B. Lewis, Edwardsville, Stanley Lewis, Pt. Edward, Tom. Roberts, Pt. Edward; Auditors: Harvey Lewis, Seward Lewis, Edwardsville.........................

East Bay.—President, John H. McDonald, East Bay; Vice-President, Peter Gillis, Secy.-Treasurer, Rev. J. W. McIssac, East Bay; Directors: Stephen D. Gillis, East Bay, R. J. Campbell, East Bay; A. J. McGillivray, North Side, East Bay; Allan R. McEachern, MacKenzie, East Bay; Joseph McNeil, East Bay; Auditors: D. R. McIssac, East Bay, Allan McEachern, MacKenzie, East Bay............

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
23	40 00	40 00	162 09	157 95	4 14
15	40 50	40 20	80 00	1 00	79 00
46	102 00	66 06	228 87	176 49	54 38
28	63 00	49 66	115 00	357 84	242 84
25	80 00	56 81	221 87	195 40	26 47
30	60 00	48 40	170 14	136 55	33 59

Grand Mira.—President, Michael D. Currie, Grand Mira South; Vice-President, Joseph McKinnon, Grand Mira South; Secy.-Treasurer, Leo Campbell, French Road; Directors: John Jos. Gillis, Archie L. Gillis, Alex. J. Gillis, Neil D. Gillis, Neil J. Gillis, Grand Mira South; Auditors: John A. Gillis, Neil G. Gillis, Grand Mira South ....

George's River.—President, E. J. Johnstone, George's River; Vice-President, Alex W. Gillis, George's River; Vice-President, Alex. W Gillis, George's River; Secy.-Treasurer, A. B. McPhee, Leitche's Creek Station; Directors John P. Harvey, George's River; George H. Young, George's River Station; Wilson Gillis, George River Station; Peter Almon, Georges River; Auditors: John McMullin, Georges River, Luke Day, Georges River........................

Groves Point.—President, Hammond Moffatt, Grove's Point; Vice-President, R. K. Morrison, Grove's Point; Secy.-Treasurer, James Stuart; Directors: Murdo Stuart, Rodk. McLeod, Dan McKenzie, Alex. McKay, John R. Bain, Grove's Point................................

Homeville and Mira Bay.—President, Donald McKeigan, Catalone Gut; Vice-President, Henry Dillon, Round Island; Secy.-Treasurer, Charles Spencer, Mira Gut; Directors: Everett Spencer, Herbert Spencer, D. J Martel, Mira Gut, Chas. Dillon, Round Island; Wesley Nicoll, Mira Gut; Auditors: Henry Dillon, Round Island, Donald McInnis, Mira Gut................................

Little Bras d'Or.—President, Parker M. Rice, Georges River; Vice-President, Robert L. Moffatt, North Sydney; Secy., W. W. Johnston, North Sydney; Treasurer, J. G. Hull, North Sydney; Directors: Thomas A. Lawley, North Sydney, W. J. Moffatt, Chas. Johnston, Levi J. Hull, North Sydney; George Howatson, Little Bras d'Or; Auditors: C. W. W. Moffatt, Warren Moffatt, North Sydney...

North Sydney.—President, R. M. Jackson, Jacksonville; Vice-President, J. Webster Allen, North Sydney; Secy., M. J. Ingram, North Sydney; Treasurer, A. K. Jackson, Jacksonville; Directors: John McLean, Jacksonville; Neal Beaton, Leitches Creek Station; John Musgrave, Jacksonville; Chas. Munn, Leitche's Creek Station; John Redmond, North Sydney; Auditors: Palmer Moffatt, North Sydney; Harry Moore, Jacksonville.........................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
20	40 50	40 20	127 45	99 83	27 60
34	49 00	43 77	221 42	204 37	17 05
20	40 00	40 00	95 75	75 45	20 30
16	44 00	41 68	181 31	166 79	14 52
41	60 00	48 39	232 63	147 78	84 85
40	42 00	40 84	104 75	76 81	27 94

Salem Road.—President, W. J. McDonald, Enon; Vice President. John A. MacDonald, Lake Uist; Secy.-Treasurer, A. J. McCuish, Lake Uist; Directors: J. W. McDonald, Salem Road; D. A. McDonald, Tera Nova, Angus McCuish, Big Glen; Alex. McDonald, Enon; D. A. McKinnon, Big Glen; Auditors: R. W. Munroe, Salem Road; Angus A. McDonald, Tera Nova;..................................

South Bar.—President A. R. Richardson, South Bar; Vice-President, A. J. McLeod, South Bar; Secy.-Treasurer, F. A. McInnis, Whitney Pier; Directors: Howard Richardson, Abner McLennan, William Murphy, Roderick McLennan, Michael Murphy, South Bar; Auditors: Y. H. Barrington, Edward Murphy, South Bar.................

Sydney Forks, President, Rod McRae, Sydney Forks; Vice-President, Robert McDonald, Sydney Forks; Secy.-Treasurer, Geo. B. McDonald, Sydney Forks; Directors: D. A. Gillis, Portage; Angus L. McDonald, Sydney Forks; Neil McNeil, Sydney Forks; Melanthon Smith, Sydney Forks, Andrew McDonald, Meadows.....................

COLCHESTER COUNTY.

Agricola.—President, H. M. Smith, Otter Brook; Vice-President, Fred Tupper, Upper Stewiacke; Treasurer, H. D. Campbell, Half Way Brook; Secy. H. C. Dunlap, Otter Brook; Directors: Hedley Creelman, Middle Stewiacke; C. C. Sill, Middle Stewiacke; J. D. Dunlap, Middle Stewiacke; C. B. Bentley, C. C. Cox, Middle Stewiacke. Auditors: J. D. Dunlap, Hedley Creelman, Middle Stewiacke.......

Annan.—President Angus Murray, South Tatamagouche Vice-President, William Baillie, South Tatamagouche; Secy.-Treasurer, H. B. Cock, South Tatamagouche; Directors; Malcolm Thompson, Arthur Tucker, Tatamagouche Mt.; John Baillie, South Tatamagouche; Jordan Thompson, Alex. Conkey, Tatamagouche Mt.......................

Balmoral Mills.—President, R. D. McKay, Balmoral Mills; Vice-President, George W. McKay, Balmoral Mills; Secy.-Treasurer, John Munro, Balmoral Mills; Directors: Hugh W. McKay, Peter A. McDonald, Robert D. McKay, George S Baillie, John A. Ferguson, Balmoral Mills; Auditors: George S. Baillie, Hugh W. McKay, Balmoral Mills...

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
76	310 00	153 47	455 46	455 46	
24	51 00	44 62	165 58	144 00	21 58
20	40 00	40 00	91 25	54 75	36 55
58	142 00	82 87	250 34	351 81	101 47
29	43 50	41 48	89 50	150 04	60 54
27	41 25	40 52	214 96	69 05	145 91

Bass River.—President, J. H. Fulton, Bass River; Vice-President, S. H Fulton, Little Bass River; Secy.-Treasurer, James Fulton, Bass River; Directors: D. H. Lank, Bass River; S. H. Fulton, Little Bass River; W. Starratt, Capt. E. Thompson, Bass River; Burton Densmore, Little Bass River; Auditors; Amos Fulton, Capt. E. Thompson, Bass River..

Bay Head.—President, Sidney Clark, R. R. No. 1, Bayhead; Vice-President, William Millard, R. R. No. 1, Bayhead; Secy., J. L Cunningham, R. R. No. 1, Bayhead; Treasurer, A. S. McDonald, R. R. No. 1, Bayhead; Directors: Arthur Upham, William Millard, A. S. McDonald, W. C. Johnson, Harry Holmes, R. R. No. 1, Bayhead......

Brookfield.—President, J. T. Bell, Brookfield; Vice-President, Walter Ross, Brookfield; Secy-Treasurer, Elwood MacLellan, Brookfield; Directors: Melville Carter, Percy Bentley, Fred Lockhart, Brookfield; John Matheson, Whidden Boomer, Brentwood...............................

Brule Shore.—President, Robert Malcolm, Brule; Vice-President, Noah Jollimore, Waldgrave; Secy.-Treasurer, James Reid, Brule Shore; Directors: Noah Jollimore, Waldegrave; Alex. MacKinnon, Brule; George Dunn, Brule Shore; A. P. Semple, Brule; George Fraser, Brule Shore; Auditors: Noah Jollimore, Waldgrave; George Dunn, Brule Shore.....

Dairy.—President, John A. Wilson, Central New Annan; Vice-President, George R. Miller, Central New Annan; Secty.-Treasurer, C. J. Cock, Central New Annan; Directors Robt. MacKay, J. D. Wilson, Central New Annan; H. McNutt, Tatamagouche Mt.; Ira Nelson, Tatamagouche; A. M. Swan, Central New Annan..........................

Earltown.—President, Geo. Macintosh, Earltown; Vice-President, Wm. M. Macdonald, Earltown; Secy.-Treasurer, Jno. A. Murray, Earltown; Directors, Thos. MacKay, W. D. Mackay, W. M. Macdonald, R. E. Mackay, J. T. Gunn, Earltown; Auditors: Geo. Macintosh, Geo. Mackenzie, Earltown...

Farmers.—President, Murdock Currie, Londonderry Station; Vice-President., Robt. McKay, Londonderry Station; Secy.-Treasurer, Harvey Gray, East Mines Station; Directors: George Dill, Londonderry Station; Edward McLean, W. P. Weatherbee, Londonderry Station; W. E. McLean, E. C. Fletcher, Glenholme.......................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
49	101 50	65 85	329 51	306 58	22 93
22	53 50	45 67	99 09	80 90	18 19
43	86 25	59 44	298 96	294 01	4 95
25	58 50	47 78	158 19	124 19	34 00
27	40 50	40 20	124 95	92 70	32 25
23	46 00	42 52	99 50	97 40	2 10
108	108 00	68 58	489 59	505 09	15 50

Londonderry.—President, J. R. Flemming, Glenholme; Vice-President, Ernest McCully, Masstown; Secy., T. W. Morrison, Glenholme, Treasurer, H. Gray, Glenholme; Directors: Capt. A. McNutt, Charles Vance, Martin McCully, Masstown; M. N. Reid, Glenholme; H. Gray, De-Bert; Auditors: Arthur Putnam, J. R Flemming, Glenholme.

Middleton.—President, David McLeod, Denmark; Vice-President, John W. Langille, Denmark; Secty.-Treasurer, Oliver Stevenson, Denmark; Directors: James R. Hogan, Denmark; R. C. Wilson, Roach Langille, Seldon Swan, John Langille, Denmark; Auditors: R. C. Wilson, Seldon Swan, Denmark..............................

Milburn.—President, John Bonyman, Millburn; Vice-President, Walter Langille, Beacon Hill; Secy.-Treasurer, Henry W. Swan, Millburn; Directors: Arthur Byers, West New Annan; John Aitcheson, Millburn, Gavin Bell, Millburn; H. W. Swan, Millburn.............................

North Earltown.— President, Wellington Ross, North Earltown; Vice-President, William M. Stewart, North Earltown; Secy.-Treasurer, Alex. W. McKay, North Earltown; Directors: Daniel G. Ross, North Earltown; David Munro, West Branch River John, Dan. Robert McKenzie, Earltown; W. Rod Murray, North Earltown; Auditors: Dan Robert McKenzie, Earltown, John M. Munro, North Earltown....................................

North River.—President, A. F. Fulton, North River; Vice-President, C. E. Blair, North River; Secy.-Treasurer, Wm. Murray, North River; Directors: Allison Dickson, Clavin McNutt, Wm. Blair, C. C. Douglas, George Payne, North River; Auditors: A. W. Higgins, Stanley Murray, North River....................................

Portaupique.—President, J. M. Brown, Portaupique; Vice-President, R. M. Creelman, Portaupique; Secy-Treasurer, H. A. Baird, Portaupique; Directors: J. D. Hill, W. P. Hennessey, Allen Carr, J. M. Brown, Edgar McMillan, Portaupique....................................

Springside.—President, Warren Johnson, Newton Mills; Vice-President., Geo. B. Hamilton, Springside; Secretary-Treasurer, F. T. Gammell, Newton Mills; Directors: Eddie Hamilton, Eastville; Lyman Fulton, Newton Mills; James Creelman, Springside; David Creelman, Newton Mills; Joe Archibald, Cross Roads; Auditors: David Creelman, Newton Mills; Geo. B. Hanilton........................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
41	92 00	61 85	310 82	200 75	110 07
36	54 00	45 87	201 52	171 96	29 56
24	47 50	43 15	132 07	86 00	46 07
26	52 00	45 04	188 61	210 50	21 89
18	79 00	56 39	138 51	83 00	55 51
43	64 00	50 08	200 33	194 95	5 38
70	112 50	70 47	227 32	185 25	42 07

Sterling.—President, J. D. Murdock, New Annan; Secy.-Treasurer, Isaac Gray, Annandale; Directors: Jas. McDonald, Ira Vincent, W. M. Campbell, Wm. Gray, John Warwick, New Annan; Auditors: Geo. Marshall, Geo. Gray, New Annan..................................

Stewiacke.—President, E. G. Campbell, Stewiacke; Vice-President, E. D. Gould, Stewiacke; Secy.-Treasurer, A. D. Fulton, Stewiacke; Directors; Foster Campbell, Orestis Wright, C. E. Gould, W. G. Ervin, Gordon Fulton, Stewiacke; Auditors: G. T. MacNutt, Burton Fulton, Stewiacke....................................

Tatamagouche.—President., W. B. McLellan, Tatamagouche, Vice-President, J. Walter Langille, Beacon Hill; Secy.-Treasurer, J. J. Clark, Tatamagouche; Directors, James Clark, Jno Tattrie, C. N. Cunningham, C. P. Bryden, Geo. Lombard, Tatamagouche; Auditors: James Bryden, Gordon Clark, Tatamagouche.........................

Waugh's River.—Pres. Alex. Matheson, Waughs River; Vice-President, A. W. McLeod, Waughs River; Secy.-Treasurer, J. M. MacKay, Waughs River; Directors, Wm. McKay, Ken Sutherland, John Walker, Alex. Hyman, J. W. Blair, Waughs River; Auditors: J. W. McKay, A W McLeod, Waughs River ....

CUMBERLAND COUNTY.

Amherst —President, Vernon Ogilvie, R. R. No 3, Amherst; Vice-President, Norman A. Black, Amherst; Secy.-Treasurer, C. H. Black, 208 Victoria St., Amherst; St. Amherst; Directors: W. W. Embree; C. V. Thompson, Ernest Embree, Joseph Bird, B. C. Gourley; Auditors: Samuel Freeman, W, N. Boomer.......................

Beckwith.—President, R. S. Flinn, Beckwith; Vice-President, Charles Ripley, Mount Pleasant; Secy., C. H. Angus, Carrington; Directors: Charles Wl Fraser, Roendale; Charles Ripley, Mount Pleasant; Judson Eaton, Beckwith; Vance Mattinson, Raymond Walker, Beckwith; Auditors: R. S. Flinn, Beckwith, Jerry Mattinson, Mount Pleasant....................................

East Wallace Union.—President, D. G. McKenzie, North Shore, Malagash; Secy., Geo. A. Miller, East Wallace; Directors: James H. Miller, East Wallace; John C. McKenzie, Anson P. Waugh, Wm. Smith Chas. Carlyle, East Wallace ....

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Total
42	42 00	40 84	172 26	163 78	8 48
55	205 00	109 33	1288 47	1225 56	62 91
36	59 50	48 18	172 49	138 00	34 49
40	45 00	42 09	137 57	133 50	4 07
166	404 25	193 03	966 09	886 39	79 70
16	40 00	40 00	113 34	67 50	45 84
21	42 00	40 84	202 52	204 97	2 44

Fox Harbor.—President, D. M. Bacon, Fox Harbor Point, Vice-President., Lewis Green, Fox Harbor; Treasurer, Stanley Robertson, Cape Cliff; Secy, James Robertson, Fox Harbor; Directors: D. R. Stromberg, Fox Harbor, Murray Robertson, Cape Cliff; J. A. McFarlane, Fox Harbor Point, Thomas McAulay, Fox Harbor; Freeman Hartling, Cape Cliff; Auditors: Murray Robertson, Cape Cliff; Laurie McFarlane, Fox Harbor Point........................

Lorneville.—President, W. H. Jackson, Lorneville; Vice-President, Manford Oxley, Tidnish; Secy., J. J. Brown, Lorneville; Directors, Earl Jackson, Allison Baxter, Chas. Ogden, Thos Ogden, Walter Embree, Tidnish; Auditors: John H Jackson, Chas Jackson, Lorneville...............

Malagash.—President, J. B. Lombard, Blue Sea Corner; Vice-President, Peter Murray, Malagash; Secy., Boyd Whiting, Stake Road; Directors: C. W. Clark, L. Treen, Arthur Treen, Jas. Beattie, J. Treen, Malagash..........

Middleboro.—President, Asa Stevens, Middleboro; Secy-Treasurer, G. G. McKim, Hartford; Directors: C. A. Fountain, Upper Middleboro; David Howard, North Middleboro; Walter Colter, Middleboro; Herbert Crawford, Percy McKim, Hartford; Auditors: Edward Howard, Ivan Crawford.

Minto.—President, David Bacon, Nappan Station; Vice-President, F. L. Roach, Nappan Station; Secy.-Treasurer, J Wellington Lowther, Nappan Station; Directors: F. L. Roach, Herbert Blenkhorn, Nappan Station; James I. Stuart, Amherst Point, J. E. Harrison, Maccan, J. McC. Pipes, Nappan Station; Auditors: D. Bacon, Nappan Station, F. L. Roach, Nappan Station...................

Parrsboro.—President, G. H. Jeffers, Lakelands; Vice-President, D. W. Holmes, Cross Roads; Secy.-Treasurer, Robie Kirkpatrick, Kirks Hill; Directors: H. R. Berry, New Prospect; D. O'Regan, James Brown, Wm. Murray, Lakelands; Harvey Smith, Parrsboro; Auditors: H. Fader, Parrsboro; Lenley Grant..........................

Pugwash.—President, Gordon Fullerton, Pugwash; Vice-President, Beecher Robertson, Pugwash; Secy-Treasurer, D. J. Mitchell, Pugwash; Directors: J. H. Matheson, Elmer Clark, Harry Tuttle, J. W. Henderson, C. C. Colborne, Pugwash; Auditors: Hugh Clark, Ernest Mitchell, Pugwash.

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
35	56 50	46 92	245 03	299 74	54 71
65	105 00	67 31	240 68	149 70	90 98
36	95 50	63 32	250 76	234 50	16 26
50	59 25	48 09	193 37	119 15	74 22
30	114 00	71 10	258 80	239 16	19 64
17	40 00	40 00	137 32	81 87	55 45
29	52 50	45 25	101 41	95 70	5 71

Shinimicas Bridge.—President, E. E. Fisher, Shinimicas Bridge; Vice-President, G. O. Smith, Shinimicas Bridge; Secy.-Treasurer, J. C. Brander, Shinimicas Bridge; Directors: G. O, Smith, J. A. Moore, A. P. Blair, L. S. Fisher, R. T. Fisher, Shinimicas Bridge; Auditors: Jas, P. Smith, Frank S Smith..

Upper Wentworth —Samuel Little, Wentworth Station; Vice-President, J N. McNutt, Wentworth Station; Secy.-Treasurer, R. C. Swallow, Wentworth Centre; Directors: W. A. Weatherbee, A. M. Ferguson, Wentworth Station; Allen Tuttle, Lower Wentworth; W. B. Henderson, Spencer Little, Wentworth Station; Auditors; W. A. Weatherbee; W. B. Henderson, Wentworth Station....................

Victoria.—President, Moore S. Thompson, South Victoria; Vice-President, Everett Webb, Victoria; Secy.-Treasurer, John W. Crowley, Streets Ridge; Directors: Duncan Ross, Edgerton Betts, Clarence Thompson, Victoria; Dan Crowley, Streets Ridge; Stanley Stewart, South Victoria....

Wallace Bay.—President, E. E. Peers, Wallace Bay; Vice-President, D. M. Brown, Wallace Bay; Secy.-Treasurer, D. M. Clift, Wallace Bay; Directors: H.T . Wells, D. M Brown, L. A. McKim, Stephen Tuttle, W. A. Tuttle, Wallace Bay..

Wallace Grant.—President, W. Johnson Stevens, South Wallace; Vice-President, Garfield Coulter, Wallace Grant; Secy.-Treasurer, A. W. Stevens, Wallace Grant; Directors: Allan Reeves, South Wallace; Wm. McFarlane, Wallace Grant; Gordon Stevens, Wallace Grant; Wm. McEachern, Wallace Highlands; M. Cole, Wallace Highlands; Auditors: Charles McEachern, Gordon Stevens, Wallace Grant.......

DIGBY COUNTY.

Belliveau Cove.—President, Lennie Belliveau, Belliveaus Cove; Vice-President, Felix Gaudet, Belliveau's Cove, Directors: Alca Belliveau, Damien Doucet, Emilier LeBlanc, Joseph C. Theriault, Augustin Theriault; Auditors: Benjamin Belliveau, Lennie Belliveau, Belliveau's Cove.......

Digby Central.—President, John O. Turnbull, Digby; Vice-President, James Trevoy, Brighton; Secy.-Treasurer, Frank W. Nichols, Digby; Directors: James Young, Digby; D. C. McKay, Acaciaville; C. B. McNeill, North Range; Johnathan Letteney, Digby; Jacob Trask, Marshalltown.

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
27	44 25	41 78	218 47	88 00	130 47
31	49 60	44 03	161 65	62 00	99 65
32	44 00	41 68	99 40	90 25	9 15
16	62 50	49 45	New	Society	
29	53 00	45 46	122 32	63 00	59 32
43	73 00	53 86	404 13	268 21	135 92
170	233 40	121 26	773 91	586 09	187 82

Gilbert's Cove.—President, Fred Sabean, Gilbert's Cove; Vice-President, Andrew Morrissey, Gilbert's Cove; Secy.-Treasurer, Clarence Kinney, Gilbert's Cove; Directors: Albert Melanson, Henry Melanson, Charles Comeau, Gilbert's Cove; Leander Kinney, Charles W. Kinney, Ashmore; Auditors: Allen Kinney, Gilbert's Cove; Henry Kinney, Ashmore.................................

Hillsburg.—President, J. B. Harris, Bear River; Vice-President, W. E. Reade, Bear River; Secy., C. F. McDormand, Bear River; Treasurer, H. R. Kinney, Bear River; Directors: Harvey Chisholm, Ezra Miller, Harry E. Harris, Charles Harris, J. B. Harris, Bear River; Auditors: C. F. McDormand, W. E. Reade, Bear River.................

Little Brook.—President, Zozinne A. Comeau, Little Brook; Vice-President, Symphoirin LeBlanc, Little Brook; Secty.-Treasurer, Arnand S. Comeau, Little Brook; Directors; Isaac H. LeBlanc, Church Point; Rupert Cothian, Little Brook; Augustine A. Comeau, Comeauville; Eddie Gaudet, Comeauville; Albame C. LeBlanc, Little Brook; Auditors: Camille Comeau, Church Point; Elithare Dugas, Little Brook Station...............................

St. Mary's.—President, Benjamin Robbins, Vice-President, James Cossaboom, Centreville; Secy., Edward H. McKay, Sandy Cove; Directors: Embree Morehouse, Charles Graham, Henry Cossaboom, Thomas Carty, Centreville, Amasa Eldridge, Sandy Cove......................

GUYSBORO COUNTY.

Erinville.—President, Patrick Walsh, East Erinville; Vice-President, Will McDonald, West Erinville; Secty., Joseph Lawlor, West Erinville; Directors: Wm. McKinnon, East Erinville; Michael Doyle, Thomas McDonald, Richard White, Michael Flynn, East Erinville; Auditors: John Walsh Harry McKinnon...............................

Glenelg.—President, David Whidden, Glenelg; Vice-President, G. L. Cameron, Melrose; Secy.-Treasurer, A. H. McKeen, Glenelg; Directors: A. G. Archibald, Arthur Fisher, Glenelg; A. G. Lawson, I Isaac Fisher, Melrose; G. B. McIntosh, Smithfield; Auditors: T. A. McKeen, A G. Archibald, Glenelg...........................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
42	54 00	45 87	186 83	212 66	25 83
80	80 00	56 81	264 67	264 67	
56	95 00	63 10	340 81	320 31	20 50
80	98 50	64 57	547 71	164 63	383 08
23	40 20	40 09	120 20	81 16	39 04
24	41 40	40 58	106 08	70 55	35 55

Goshen.—President, Andrew Sinclair, South River Lake; Vice-President, James A Sinclair, Goshen; Secy.-Treasurer, Alex. Sinclair, Goshen; Directors: J. F. Forbes, Harry Sinclair, Leonard Sinclair, Alford Forbes, Goshen; Wm. McIntosh, South River Lake; Auditors: A. F. McNaughton, John A. Sinclair, Goshen..............................

Guysboro.—President, J. A. Fulton, Guysboro; Vice-President, H. L. Torry, Guysboro; Secty.-Treasurer, H. M. Scott, Guysboro; Directors: Wm. Johnson, Roachvale; Daniel Kennedy, Tompkinsville; John H. Skinner, John E. Dillon, W. E. Scott, Guysboro; Auditors: Clarence Torry, Guysboro; Chas. E. Cook, Cook's Cove.............

Intervale.—President, Wm. G. Aikins, Intervale; Vice-President, James Wall, Intervale; Secty.-Bruce Ferguson, North Intervale; Directors: John McPherson, Hugh Ferguson, David Cameron, William McKenzie, Wm. F. Aikins, Intervale...................................

Lakedale and Giant's Lake.—President, Thomas Kennedy, Lakedale; Vice-President, Angus McIsaac, Giant's Lake; Secty.-Treasurer, Ronald McIsaac, Giant's Lake; Directors: John C. McIsaac, Giant's Lake; Rod McLean, Angus Dan McIsaac, Lake Dale; John J. McNeil, C. P. Miller, Giant's Lake; Auditors: Rod McLean; Angus Dan McIsaac, Lake Dale...............................

Manchester.—President, D. F. Connoly, M. Manchester; Vice-President, J. R. O'Brien, M. Manchester; Secty.-Treasurer, Stanley Lipsett, Manchester; Directors: Hugh Cummings, Port Shorman; John H. Myers, Edwin M. Torry, Milton Simpson, M. Manchester; Harry Simpson, Manchester...

New Town.—President, James McKay, East River St. Mary's; Vice-President, Martin Gunn, East River St. Mary's; Secty.-Treasurer, W. H. Archibald, New Town; Directors: A. T. McBain, Wellington Sutherland, Wesley McKay, Neil Gunn, Samuel H. Archibald; Auditors: Wellington Sutherland, Robert Archibald.................

Port Hilford and Wine Harbor.—President, J. G. Cooper, Wine Harbor; Vice.-President, J. R. Hurst, Port Hilford; Secty.-Treasurer, F. L. Hewitt, Port Hilford; Directors: G. A. Hirschfield, Andrew Gillis, David Flemming, Wine Harbor; Moses Mugford, Port Hilford; Auditors: J. R. Kinley, Port Hilford; J. D. McDonald, Wine Harbor..........

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
31	44 50	41 89	81 00	96 35	15 35
77	121 00	74 05	197 80	199 57	1 77
47	55 25	46 40	109 63	109 94	31
27	45 00	42 09	171 57	155 56	16 01
91	108 25	68 67	229 52	216 95	12 57
19	40 00	40 00	91 79	51 79	40 00
34	40 00	40 00	93 60	93 03	57

Stillwater.—President, H. A. McLean, Stillwater; Vice-President, J. K. McKeen, Stillwater; Secty., W. A. McDonald, Stillwater; Treasurer, A. McDonald, Stillwater; Directors: Lochie Fraser, Goldenville; Murdock Whitman, Sherbrooke; David McLean, Stillwater, David Archibald, Rod Weir, Stillwater; Auditors: W. B. Fraser, M. A. Whidden, Stillwater..................................

HALIFAX COUNTY.

Dartmouth.—President, Maynard Tulloch, Dartmouth; Vice-President, W. W. Peverill; Secty.-Treasurer, G. E. Eisener, Dartmouth; Directors: W. L. Eisener, H. Baker, C. J. Keeler F. W. Settle, J. R. Morash, Dartmouth; Auditors: Frank Settle, Edwin Morash, Dartmouth..........

Eastern Star.—President, James Thomas, Preston; Vice-President, Seymore Lapire, Preston; Secretary, W. B. Thomas, Preston; Treasurer, Samuel Williams; Directors: John Brooks, E. Ewing, Peter Williams, George Williams, Edward Crawley, Preston; Auditors: Seymour Lapire, Richard Brooks, Preston...................................

Elderbank.—President, Robt. Gibson, Elderbank; Vice-President Charles Ogilvie, Elderbank; Secty.-Treasurer, H. E. Cole, Elderbank; Directors: Norman Cruikshank, Henry Grant, M. Cole, John Ogilvie, Morton McMullin, Elderbank; Auditors: John Ogilvie, Morton McMullin, Elderbank...................................

Halifax.—President, R. H. Edwards, Bedford Row, Halifax; Vice-President, John MacAloney Fairview; Secy., H. H. Blois, 255 Quinpool Rd.; Treasurer, R. O'Neil Duggan, Water St., Halifax; Directors: G. Creighton, G. M. Huggins, Prof. Moore, G. R. Marshall, R. O. Duggan, Halifax......

Middle Musquodoboit.—President, Samuel Hanna, Mid. Musquodoboit; Vice-President, Chas. A. Fulton, Mid. Musquodoboit; Secty.-Treasurer, Chas. Logan, Mid. Musquodoboit; Directors: Roy Archibald, Elmsvale; Sydney McKeen, Wm. H. Gladwin, Mid. Musquodoboit; Geo. H. Taylor, Chaswood; Ed. McFetridge, Elmsvale. Auditors: Robt. Kaulbach, F. Arnold Gladwin...........................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
24	40	40 00	224 40	232 60	11 80
40	40 00	40 00	253 81	199 20	54 61
22	44 00	41 68	101 61	96 00	5 61
19	64 25	50 19	291 28	259 06	32 22
34	52 00	45 04	410 65	60 25	350 40
70	172 00	95 45	838 19	808 27	29 92

Musquodoboit Harbor.—President, Wesley Ritcey, Musquodoboit Harbor, Vice-President, George Landels, Musquodoboit Har.; Secy.-Treasurer, Spencer Sutherland, Musquodoboit Har.; Directors: James A. Ritcey, John H. Rowling, Alex. Slade, R. J. Stoddard, Musquodoboit Har; Oswald Mosher, Smith Settlement..........................

Seaside.—President, Norman Hiltz, W. Lawrencetown; Vice-President, Isaac Sellars, W. Lawrencetown; Secretary, Freeman Sellars, W. Lawrencetown; Directors: Henry Nangle, Morris Conrad, William Robinson, Ervan McDonald, W. Lawrencetown; Auditors: Sidney Sellars, Morris Conrad, W. Lawrencetown..........................

HANTS COUNTY.

Avon.—President, David Withrow, Newport Landing; Vice-President, Lennie Parker, Newport Landing; Secty-Treasurer, B. E. Mosher, Highfield; Directors: W. B. Wallace, Terry Parker, Newport Landing; E. B. Mosher, Highfield; Wm. Withrow, Newport Landing; Auditors: Freeman Connors; George Allison..........................

Burlington.—President R. P. Harvie; Vice-President, Alonzo Harvie; Secty.-Treasurer, Robie C. Sanford; Directors: Clarence Harvie, James Sanford, Daniel Young, Welsford Salter, Douglas Salter; Auditors: H. H. Card, Harvey Lynch, Burlington..........................

Fenwick.—President, Seymour Main, East Noel; Vice-President, O. J. O'Brien, Noel, Secty., J. H. Densmore, Burncoat; Treasurer, Sydney O'Brien, Noel; Directors: Wilbert McCulloch, Noel Shore; Morris Densmore, East Noel; Selwyn O'Brien, Noel, Morton Faulkner, Frederick Crowe, Burncoat..........................

Gore.—President, W. L. Wallace, West Gore; Vice-President, Wm. B. McDougall, West Gore; Secty.-Treasurer, H. B. McDougall, West Gore; Directors M. A. Wallace, Esson McDougall, Seymour Wallace, Ansell Scott, Gore; Ersom Williams, Riverside Corner; Auditors: Jas. A. Blois, F. B. McPhee..........................

Hantsport.—President, Wilbert Dorman, Hantsport; Vice-President, David Shaw, Mt. Denson; Secy.-Treasurer, Roy A. Davis, Mt. Denson; Directors: Gordon McKean; George Frizzle, Alvin Graham, Hantsport; Elmore Faulkner, Wm. Riley, Mt. Denson; Auditors: L. P. Schurman, Mt. Denson, John Woolaver, Hantsport....................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
62	99 50	65 00	185 80	185 50	30
15	41 00	40 42	83 00	81 26	1 74
25	120 00	73 61	299 49	191 50	107 99
23	47 00	42 93	187 66	87 15	100 51
34	57 00	47 14	254 38	200 62	53 76
17	83 50	58 28	261 98	232 50	29 48
50	85 00	58 91	280 09	237 30	42 79

Kempt.—President, Palmer Burgess, Kempt Shore; Vice-President, Rufus Rose, Kempt Shore; Secty.-Treasurer, E. E. Skaling, Kempt Shore; Directors: LeRoy P. Sandford, Summerville; Terrence Mosher, J. B. Armstrong, W. E. Wilcox, H. E. McDonald, Kempt Shore; Auditors: LeRoy P. Sanford, Summerville; Rufus Rose, Kempt Shore.......

Maitland.—President, Thomas G. Smith, Maitland; Vice-President, Herbert Eaton, Maitland; Secty.-Treasurer, W. F. Roy, Maitland; Directors: John Carr, Lawson Hayes, Herbert Eaton, Capt. Geo. Douglas, Duncan McDougall, Maitland; Auditors: Duncan McDougall, Wm. McKenzie, Maitland..

Meander.—President, Fred Cameron, Newport; Vice-President, Wm. Baxter, Newport; Secy.-Treasurer, Morris Dill, Newport; Directors: Clayton McKay, Herbert Robinson, Murdock Harvey, Morley Harvey, Howard Harvey, Newport; Auditors: A. L. Harvey, Stanley Forest, Newport.

Progress.—President, George Wright, Elmsdale; Vice-President, George Fraser, Elmsdale; Secty.-Treasurer, Hugh Fraser, Elmsdale; Directors: George Fraser, Jacob Gilby, E. McMillan, Frank McDonald, H. Roulston, Elmsdale; Gordon Casey, G. E. McMillan, Elmsdale................

St. Croix.—President H. Percy Blanchard, Ellerhouse; Vice-President, J. A. Scott, St. Croix; Secty.-Treasurer, N. S. Hunter, St. Croix; Directors: George Smiley, St. Croix; Murray Phillips, Sweet's Corner; H. H. Miller, Newport Station; Geo. Spence, Ellerhouse, A. L Sanford, St. Croix; Auditors: Walter Spence, Clifford Smith, St. Croix.........

Scotch Village.—President, B. Anthony, Mosherville; Vice-President, O. G. Walley, Scotch Village; Secty.-Treasurer, L. M. Smith, Scotch Village; Directors: Job Sanderson, Macumber, Scotch Village; Lorenzo Anthony, Irvin Prime, Percy Cochrane, Scotch Village; Auditors: H. W. Dimock, Percy Cochrane, Scotch Village.........................

Selmah.—President, Wm. Sterling, Sterling Brook; Vice-President, Robt. Cox, Sterling Brook; Secty.-Treasurer, Harold Fiske, Selmah; Directors: A. M. Anthony, Lower Selmah; Harry Densmore, Ormond Sterling, Sterling Brook; Cyrus Weldon, Selmah; George McDuffie, Selmah; Auditors, John J. McLean, Clarence Putnam, Selmah...............

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
20	40 00	40 00	265 10	229 70	35 40
22	40 00	40 00	209 81	80 55	129 26
19	40 00	40 00	146 66	44 05	102 61
43	51 00	44 62	164 95	154 65	10 30
50	50 00	44 20	New	Society	
26	66 00	50 92	411 44	400 40	11 04
26	62 00	49 24	168 79	106 35	62 44

Shubenacadie.—President, James McKenzie, Shubenacadie; Vice-President, Harry Stewart, Shubenacadie; Secty, A. H. Snide, Shubenacadie; Treasurer, E. M. Dewis, Shubenacadie; Directors: Allison McDonald, Thos. Blackburn, Shubenacadie; Edwin Murdock, Milford; George Moore, W. D. Bowers, Shubanacadie; Auditors: Watson Smith, J. A. Kirkpatrick, Shubenacadie.........................,..

Windsor.—President, Wm. O'Brien, Windsor Forks, Vice.-President, E. B. Sweet, Martock, Secty., Geo. W. DeWolf, Three Mile Plains; Treasurer, George O'Brien, Windsor Forks; Directors: James Vaughn, Windsor Forks; George Haley, Lewis Millett, Martock, Thomas Aylward, Falmouth; George Wilson, Windsor; Auditors: Campbell McNeil, Winburn Saunders............................

INVERNESS COUNTY.

Belle Cote.—President, John D. Doucet, Belle Cote; Vice-President, George T. Munroe, Belle Cote; Secty.-Treasurer, John A. McLellan, Belle Cote; Directors: Arch D. McLellan, Patrick LeBlanc, Marcellin Chiasson, Constant AuCoin, Thos. B. Shaw, Belle Cote.................

Black River —President, A. D. Beaton, Glenora Falls; Vice-President, James Beaton, Beatonville; Secty.-Treasurer A. J. Campbell, Beatonville; Directors: Neil McKinnon, John A. Campbell, Glenora Falls; M. F. Campbell, Beatonville; Angus Beaton, Archie Campbell, Beatonville.........

Cheticamp.—President, Baptiste Lefort, Point Cross; Secty.-Treasurer, Patrick Cormier, Point Cross; Directors-: John Cormier, Emilien Lefort, Paul Deveau, Charles AuCoin Delfin Luedee, Point Cross; Auditors, Philip LeBlanc, Charles T. Lefort, Point Cross.......................

Dunvegan.—President, Dan N. McLennan, Dunvegan; Vice-President, James N. McLeod, St. Rose; Secretary Treasurer, D. J. McLeod, Dunvegan; Directors: John C. McLeod, Archie Beaton, Fred A. McLellan, Dunvegan; Auditors: Rodk. McRae, Ronald McIsaac, Dunvegan.....

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Total
114	275 00	138 73	902 31	594 44	307 87
75	271 00	137 04	435 28	335 72	99 56
34	40 00	40 00	New	Society	
19	49 50	44 00	282 74	185 00	97 74
41	72 00	53 45	254 19	145 40	108 79
24	48 00	43 36			

Emerald —President, Alex. Miller, Emerald; Vice-President, Nicholas Coady, Emerald; Secty.-Treasurer, James P. Tompkins, Emerald; Directors: Joseph R. Murray, John I. Murphy, Alex. Tompkins, Daniel McLellan, Emerald; Auditors: Alex Miller, John I. Murphy, Emerald.........

East Margaree.—President, A. A. Taylor, Margaree Harbor; Vice-President, J. R. LeBlanc, East Margaree; Secty.-Treasurer, R. MacDonald, East Margaree; Directors: D P LeBlanc, P J LeBlanc, East Margaree, L L McNeil, Scotch Hill, D J. McKinnon, Margaree Harbor...........

Glenville.—President, D. D. MacLellan, Glenville; Vice-President, D. A. MacLellan Glenville; Secty.-Treasurer, J. J. MacLellan, Glenville; Directors: John A. MacLellan Allan D. MacLellan, D. W. MacLellan, Angus Gillis, Glenville; Auditor: Neil D. McInnis, Glenville................

Inverness.—Hugh G. Cameron, Inverness; Vice-President, A. J. McIsaac, Inverness; Secty.-Treasurer, Dan A. McIsaac, Inverness; Directors: A. J. McLellan, H. L. McDougall, J. M. McLeod, John A. Beaton, John E. Beaton, Inverness; Auditors: W. W. Lawrence, D. D. McEchen, Inverness.....................................

Judique.—President, John D. Graham, Judique; Vice-President, John D. McIsaac, Judique North; Secty.-Treasurer, Wm. McDonnell, Hillsdale; Directors: John A. McDonald, Angus S. Graham, A. A. Beaton, Judique; Allan J. McInnis, Upper South West; Theo. McDongall, Judique North; Auditors: John D. McLellan, JudiqueNorth; Angus H. McIsaac, Rear Little Judique.......................

Marble Mountain.—President, D. J. Morrison, Marble Mountain; Vice-President, A.A.Campbell,Marble Mountain; Secty.-Treasurer, John D. MacAskill, Directors: John McKay, Archie Campbell, John H. McKillop, Neil R. McKenzie, M. A. Campbell, Marble Mountain...........

Margaree Forks.—President, John J. Coady, Margaree Forks; Vice-President, Peter McDaniel, Margaree Forks; Secty.-Treasurer, Duncan E. McDonald, Margaree Forks; Directors; A. W. Chisholm, Gabriel Chiasson, Peter J. Coady, Chas. J. Miller, John A. Chiasson, Margaree Forks; Auditors: M. A. Doyle, Norrie Chiasson, Margaree Forks.

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
16	40 00	40 00	216 30	171 34	44 96
50	79 35	56 50	165 90	196 45	30 55
28	239 00	123 60	196 35	123 17	73 18
95	135 00	79 92	New	Society	
43	43 00	41 29	143 43	79 93	63 50
37	49 50	44 00	133 34	85 29	48 05
35	85 00	58 90	196 01	203 77	7 76

North East Margaree.—President, John A. Burton, N. E. Margaree; Vice-President, Joseph H. Ross, N. E. Margaree; Secty., Albert Ingraham; Treasurer., Ralph McPherson, N. E. Margaree; Directors: James M. Murphy, Porter Ingraham, Simon Fraser, John Carmichael, James P. McDonald, N. E. Margaree; Auditors: Simon Frazer, John F. Carmichael, N E Margaree ....

Orangedale —President, Archibald MacPhail, Orangedale; Vice-President, Wm Miller, Orangedale; Secy, John H MacLean, Munroe's Bridge; Directors: L S. Cassels, Neil D. Gillis, Murdock MacIver, Allen D. MacLean, Duncan Cameron, Orangedale..........................

Port Hawkesbury.—President, A. Bain, Port Hawkesbury; Vice-President, F. J. McInnis, Port Hawkesbury;? Secty.-Treasurer, J. J. Williams, Port Hawkesbury; Directors, Reuben Hart, Farquhar MacPherson, A. C. Chisholm, Wm. Williams, Port Hawkesbury; A. E. Morrison, Point Tupper......................................

Port Hood.—President, D. F. McLean, Port Hood; Vice-President, John A. McDonnell, Rear Port Hood; Secty.-Treasurer, John R. McDonald; Directors: John A. Gillis, Angus McPhie, Little Mabou; John J. Beaton, Martock McPherson, Rear Port Hood; Allan Gillis, Port Hood.......................................

River Denys.—President, Jas. M. R. McIntyre, River Denys Station, Vice-President, W. D. McLennan, River Denys; Secty.-Treasurer, John A. McLennan, River Denys; Directors: Hugh M. McLean, Big Brook; Hugh P. McIntyre, John D. McKay, River Denys Station, Malcolm McKenzie, River Denys, K. M. McKenzie, River Denys; Auditors: M. D. McLeod, Alex. R. McLeod, River Denys Station.....

Rossville.—President, M. H. McLeod, N. E. Margaree; Vice-President, John J. McDaniel, N. E. Margaree; Secty.-Treasurer, J. Mariner Smith, N. E. Margaree; Directors: Norbert McDaniel, John L. Tompkins, John A. Dunn, Peter P. Coady, Caleb Ross, N E Margaree; Auditors: Donald Ethridge, Patrick Munro, N E. Margaree........

St. Joseph.—President, Germain J. Chiasson, Friar's Head Chapel; Vice-President, David J. Doucett, Grand Etang; Secty, John B. J. Chiasson, Frair's Head Chapel; Treasurer, Marcellin AuCoin, Directors: P. AuCoin, Jr., Louis J. Cormier, Frair's Head Chapel, Peter Porier, David J. AuCoin, Thos. E. Doucett, Grand Etang.........

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
48	60 50	48 62	98 28	95 82	2 46
47	92 50	62 05	224 47	173 02	51 45
64	134 00	79 49	New	Society	7 76
42	51 00	44 62	108 82	72 57	36 25
26	52 00	45 04	95 15	95 40	25
16	48 00	43 36	171 74	122 14	49 60
136	136 00	81 18	252 53	180 97	71 56

South West Margaree.—President, D. D. McFarlane, S. W. Margaree; Vice-President, Allan A. McDonald, S. W. Margaree; Secty., A. S. MacDougall; Treasurer, Simon Gillis, S. W. Margaree; Directors: Alex H. Gillis, James M. McFarlane, Upper Margaree; D. J. Gillis, D. E. Collins, James M. McDonald, S. W. Margaree; Auditors: J. D McFarlane, James F Collins, S. W. Margaree..............

KINGS COUNTY.

Aylesford.—President, Freeman Meister, Auburn; Vice-President, F. K. Patterson, Aylesford; Secty.-Treasurer, R L Patterson, Aylesford; Directors: S. S. Selfridge, C. S. Horsenell, W. C. West, Dimock Bowlby, Alex. Patterson, Aylesford; Auditors: Wesley Graves, D. W. Porter, Aylesford..

Dalhousie East.—President, C. P. Wilson, Dalhousie East; Vice-President, G. A. Taylor, Dalhousie East; Secty., John Long, Dalhousie, East; Treasurer, W. O. Wright, Dalhousie East, Directors: Dean Crouse, H. S. Taylor, E. H. Saunders, J. E. Barkhouse, Solomon Meldrum, Dalhousie East ....

Gaspereau.—President, Emory Coldwell, Gaspereau; Vice-President, R. A. Kinnie, Gaspereau; Secty.-Treasurer, P. J. Gertridge, Gaspereau; Directors: K. E. Hunter, E. W. Duncanson, Merton Kennie, Gaspereau; Ralph Simpson, Melanson; F. L. Gertridge, Gaspereau; Auditors: Wilbert Duncanson, A. B. Coldwell, Gaspereau.................

Highland.—President, George Brown, North Mountain; Vice-President, Zac West, Halls Harbor; Secty.-Treasurer, Charles Watson, Halls Harbor; Directors: Clyde Bezanson, Borden Steele, Alfred Brown, William Wood, B. Porter Halls Harbor; Auditors: Harry Wood, Buov Porter, Halls Harbor......................................

Kings County.—President, J. Oscar Harris, Wolfville; Vice-President, F. G. Curry, Hortonville; Secty. H. D. Fuller, Hortonville; Directors: F. E. Fuller, Ross Fullerton, L. E. Fuller, R. W. Woodman, Grand Pre; L. H. Curry, Hortonville; Auditors: S. A. Bowser, Miss A. M. Stewart, GrandPre...

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
34	52 00	45 04	231 26	167 78	63 48
33	100 25	65 30	343 92	239 94	103 98
32	64 22	50 08	246 74	265 38	18 64
59	152 00	87 05	547 91	230 00	317 91
46	92 00	61 84	292 47	246 90	45 57
88	251 00	128 64	508 66	316 21	192 45

Kingston.—President, E. L Foster, North Kingston; Vice-President, H J Neily, North Kingston; Secty , G S Smith, North Kingston; Directors: Thomas Hill, F W. Foster, J. C. Welton, H. J. Neily, B. W. Cleveland, North Kingston..................................

Morristown.—President, W. A. Easson, Aylesford; Vice-President, G. E. Hutchinson, Morristown; Secty.-Treasurer, Geo. A. Roland, Aylesford; Directors: Geo. West, Ross MacNeil, Otis Nichols, F. Johnson, E. A. Hutchinson, Morristown; Auditors: F. Johnson, E. A Hutchinson, Morristown..................................

Scott's Bay.—President, Oxley Steele, Scott's Bay; Vice-President, M. W. Steele, Scott's Bay; Secty.-Treasurer, H. L. Corkum, Scott's Bay; Directors: Jasper Steele, Owen Steele, Daniel Legge, Melborne Corkum, Roland Legge, Scott's Bay; Auditors: Owen Steele, Roland Legge.........

South Berwick.—President, R. H. Banks, Waterville; Vice-President, N. A. Osborne, Waterville; Secty., H P. Banks, Waterville; Directors: R. M. Shaw, Waterville; H. S. Shaw, Berwick; I. B. Shaw, Berwick; Wm. Skinner, Berwick; J. N. Chute, Berwick; Auditors: N. A. Osborne, R. M. Shaw, Waterville..............................

Tremont.—President., E. G. Jefferson, Tremont; Vice-President, M. E. Baker, Tremont; Secty-Treasurer, G. O. Woodbury, Tremont; Directors: Geo. Ward, Church Ward, Charles Welton, Ralph Saunders, Tremont; Erie Neily, Torbrook Mines; L. P. Welton, Kingston Village; Auditors: J. A. Banks, Walter McGregor, Tremont................

Union.—President, Leander Eaton, Canard; Vice-President, Geo. R. Pineo, Upper Canard; Secty.-Treasurer; Herbert S. Ells, Canard; Directors: James E. MacGowan, Canard; Fred W. Thomas, J. E. Kinsman, Walter E. Eaton, J. H. Morris, Upper Canard; Auditors: Robert O. Harris, Upper Canard; Newton A. Eaton, Canard................

West Cornwallis.—President, A. R. Jordan, Grafton; Vice-President, A. M. Bishop, Secty.-Treasurer, Philip S. Ilsley, Somerset; Directors: W. A Kinsman, Welsford; H. J. Bryden, Somerset; J. W. Baker, Somerset; J. B. White, R. L. Palmer, Welsford; Auditors: R. S. Spicer, Welsford; F. A. Illsley, Somerset...............................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
30	93 00	62 26	166 19	202 86	36 67
25	64 75	50 40	226 08	219 55	6 53
34	58 00	47 56	264 10	134 65	129 45
52	93 00	62 26	296 16	114 15	182 01
52	99 50	64 99	266 25	237 32	28 93
51	209 00	111 02	472 84	189 57	283 27
39	64 00	50 07	158 01	149 09	8 92

LUNENBURG COUNTY.

Bridgewater.—President, A. W. Hebb, Bridgewater; Vice-President, Claude Cook, Bridgewater; Secty. Treasurer R. B. H. Robertson, Bridgewater; Directors: Scott Hebb, Charles Cook, Peter Wydle, Lemuel Hebb, Charles Walker, Bridgewater; Auditors: G. A. Hubley, Rev. P. H. Corbin, Bridgewater..............................

Blandford.—President, Warren Publicover, Blandford; Vice-President, Rufus Gaetz, Blandford; Secty.-Treasurer, Solomon Zink; Directors: Austin Cleveland, John Backman, Bayswater; Henry Gates, Warren Publicover, Austin Zink, Blandford..................................

Central —President, Charles Silver, Rhodes Corner; Vice-President, Charles Wentzel, Rhodes Corner; Secty-Treasurer, W. L. Mulock, Rhodes Corner; Directors: Isreal Beck, David Hirtle, Upper LaHave; Robert Randall, James Demone, Rhodes Corner; Alfred Demone, Whynot Sett..

Centreville.—President, Moody Langille, Barss Corner R. R. No. 1; Vice-President, R. D. Webber, R. R. No. 1, Barss Corner; Secty.-Treasurer, J. L. DeLong, Barss Corner R. R. No. 1; Directors: W. W. Crandall, Barss Corner; E. H. Nichols, Union Square; C. R. DeLong, Barss Corner, R. R. No. 1, C. R. Grant, Barss Corner R. R. No. 1; Adam Webber Scarsdale; Auditors: M. B. Delong, L. J. Dunn, Barss Corner R. R. No. 1..................................

Chester.—President, John A. Webber, Chester; Vice-President, Abner Webber; Secty.-Treasurer, E. D. Lordly, Chester; Directors: Harry Walker, Freeman Pulsifer, Urban Stevens, Augustus Whitford, Frank Stevens; Auditors: Geo. H. Longard, Hezekiah Cook, Chester................

Farmers.—President J. Melburn Wentzell, Maplewood; Vice.-President, Nathan Wentzell, Maplewood ; Secty.-Treasurer, H. A. Rafuse, Parkdale; Directors: W. S. Conrad, H. M. Wentzell, Joseph Frank, Maplewood, G. F. Rafuse, Parkdale, K. P. Wentzell, Maplewood..................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
171	294 50	146 92	2418 13	1431 71	986 42
53	53 00	45 46	140 68	200 05	59 37
31	49 50	44 00	151 35	108 50	42 85
52	60 50	48 60	194 11	247 92	53 81
76	80 25	56 91	207 98	248 89	40 91
36	88 50	60 37	187 96	189 43	1 47

Isle of the Sea.—President, Alvin Cross, Tancook Island; Vice-President, H. B. Slaughenwhite, Tancook Island; Secty., R. B. Stevens, Tancook Island; Treasurer, A. H. Stevens, Tancook Island; Directors: Steadman Wilnoff, Thomas Hisler, Sebiston Cross, Benj. Langille, Albert Mason, Tancook Island; Auditors: Hibbert Baker, Wesley Stevens, Tancook Island..........................

Lakeside.—President, J. E. Hallamore, New Cornwall; Vice-President, Alden Barkhouse, New Cornwall; Secty., A. W. Dauphinee, New Cornwall; Treasurer, Augustus Ernst, New Cornwall, Directors: Esram Spidell, Bamford Robar, Weedal Thompson, Amos Daurey, Aubrey Bruhm, New Cornwall ; Auditors: Ephraim Naas, Joshua Bruhm, New Cornwall......................................

La Have River.—President, Albert Rhodenhiser, West Northfield Vice-President, Uriah Kiser, Lower Branch; Secty., Wallace Rhodenhiser, Bridgewater; Directors: A. F. Smith, Arthur Conrad, Lower Branch; Mark Rhodenhiser, West Northfield; Claude Cook, Bridgewater; G. A. Crouse, Lower Branch; Auditors: Albert Rhodenhiser, George Hirtle, West Northfield..................................

Lapland.—President, Garfield Crouse, Lapland; Vice-President, Edgar Hirtle, Lapland; Secty.-Treasurer, Elijah Hirtle, Lapland; Directors: Leroy Crouse, Elijah Hirtle, Lapland; J. Wile, Harold Wile, Waterloo, Joe Zink, Laconia.

Lewiston.—President, Harry Reddan, Mill Road; Vice-President, Bennett Walker, New Ross; Secty.-Treasurer, W. E. Hirtle, Mill Road; Directors: Freeman Dill, Windsor Road; Harden Walker, Wallace Russell, New Ross, Will Keddy, Mill Road, Harvey Walker, New Ross............

Mahone Bay.—President, H. L. Lane, Mahone; Vice-President, H. L. Mitchener, Mahone; Secty., C. U. Mader, Mahone; Treasurer, J. H. Mader, Mahone; Directors: George A. Mader, Maders Cove, Reuben Smeltzer, Oron Mader, Maders Cove; Azariah Kaulbach, Oakland; Ozom Ernest, Mahone.............................

Maitland.—President, Chas. Barry, Barry's Corner; Vice-President, Robert Eichel, Barry's Corner; Secty.-Treasurer, N. W. Eichel, Barry's Corner; Directors: Archie Barry, Demas Langille, Barry's Corner; Alfred Demone Rhodes Corner, Artemus Joudrey, Bridgewater; Wallace Slaughenwhite, Bridgewater; Auditors: Robt. Eichel, Wm. Veinot, Barry's Corner...........................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
50	64 00	50 08	239 75	171 38	68 37
42	47 50	43 14	144 08	85 10	58 98
23	83 00	58 06	181 08	139 68	41 40
32	40 00	40 00	New	Society	
24	41 00	40 42	186 88	96 30	90 58
152	155 50	88 54	777 73	375 84	401 89
46	57 00	47 14	123 33	104 48	18 85

Malagash.—President, R. A. Backman, Lunenburg; Vice-President, Adam Knickle, Heckman's Island; Secty.-Treasurer, Willie J. Anderson, Lunenburg; Directors: Robert Swartz, Henry Myra, Allen Schnare, Kenneth Crouse, Alonzo Rhodenhiser..............................

Midville.—President, James Snyder, Midville; Vice-President, Nathaniel Hebb, Newcombvillle; Secty., Bamford Snyder, Midville; Treasurer, Albert Snyder, Midville; Directors: Howard Wentzell, Jacob Snyder, Stephen Smith, Midville, Silas Connell, LaHave Branch; Albert Snyder, Jacob Snider, Midville, Solomon Knox, New Canada.......

New Ross.—President, H. A. Meister, New Ross; Vice-President, D. M. Turner; Secty.-Treasurer, W. Edwin Larder; Direcors: John A. Meister, Patrick Boglan, L. Russell, New Ross; Auditors: Capt. A M. Ross, Norwood Gates, New Rose..............................

Oak Hill.—President, H. A. Silver, Bridgewater; Vice President, Whitford Ernest, Bridgewater; Secty.-Treas., Owen G. Dauphinee, Bridgewater: Directors: Timothy Whynot, James Bailey, Titus Rhodenhizer, Peter Ernest, Walter Sorette, Bridgewater; Auditors: Titus Ramey, Charles Spidle, Bridgewater..........................

Riverside.—President, J. F. Penny, New Germany; Vice-President, Wm. Eisenhaur, New Germany; Secty.-Treasurer, D. W. Morton, New Germany; Directors: Timothy Morton, New Germany; Directors: Timothy Morton, A. B. Feindel, H. P. Chesley, Albert Whynot, Charles Warner, New Germany; Auditors: A. H. Woodworth, John Tretheway, New Germany.......................

Union.—President Casper Hirtle Hemford; Vice-President, John Simpson, Simpson Corner; Secty.-Treasurer, Herbert Silver, Hemford; Directors: David Silver, Arch Snider, David Mailman, Arthur Lohnes Hemforth, Jos. Simpson, Simpson Corner; Auditors: Aulden Mailman, Harvey Mailman, Hemford..........................

United Farmers.—President, Collins Herman, Herman's Island; Vice President, Stephen Roach, Martin's Brook, Secty.-Treasurer, A. E. L. Fritze, Lunenburg; Directors: R. J. Smeltzer, C. Smeltzer, McKinnon Westhover, Martin's Brook; Jos. Joudrey, Maders Cove; Howard Baker, Her-Herman's Island; Auditors: Jos. Smeltzer, Cecil Meisner, Herman's Island..................................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
161	208 00	110 57	404 28	294 35	109 83
47	80 50	57 02	275 61	208 72	66 89
57	70 80	52 94	277 91	259 60	18 31
43	80 25	56 91	211 34	173 45	37 89
47	55 50	46 51	160 11	107 60	52 51
35	43 50	41 47	125 49	85 7	39 79
28	51 00	44 62	188 58	152 40	36 18

Upper Northfield.—President George Fancy, Northfield; Vice-President, Lem Pennie, Northfield; Secty., Harry McKay, Northfield; Treasurer, Jos. MacKay, North-? field; Directors, James McKean, Stephen Mossman, Riversdale; Abel Young, Watford; George Fancy, Lem. Pennie, Northfield; Auditors: Arch Pennie, Lem Pennie, Northfield.

West Northfield.—President, Robt. Wentzell, West Northfield; Vice-President, S. M. Ramee, West Northfield; Secty.-Treasurer, John Langille, West Northfield; Directors, Wm. B. Wentzell, Wentzell's Lake; Wm. S. Sarty, Wentzell's Lake; Hugh Rhodenhiser, Albert Feiner, Edwin Bruhm, West Northfield; Auditors: Robert S. M. Ramee, West Northfield..................................

PICTOU COUNTY.

Big Island.—President, John McLean, Big Island; Vice-President, Wm. McGregor, Big Island; Secty.-Treasurer; Ewen Cameron, Big Island; Directors; Wm. McGee, Lauchlin McLean, Donald McGlashan, Jas. F. McDonald, John T. McGregor, Big Island........................

East River.—President, Joseph H. Grant, Springville; Vice-President, Smith C. Fraser, R. R. No. 1. Eureka; Secty.-Treasurer, Sinclair Cameron, Bridgeville; Directors: Rod, Chisholm, P. L. Lithgow, Bridgeville, Baxter Campbell Springville, Edwin McKeen, Joseph Delaney, R. R. No. 1, Eureka; Auditors: A. C. McDonald, P. J. Grant, Springville.

Egerton.—President, Chas. Matheson, Fox Brook; Vice-President, Mowatt McKay, Riverton; Secty., H. D. McLeod Hopewell; Treasurer, A. G. McKay, Riverton; Directors: John Cameron, Fox Brook; Rod McLean, Hopewell; Samuel McKay, Riverton; Mowatt McKay, John C. McDonald, Riverton..............................

Elmfield and Plainfield.—President, J. Rod McDonald, R. R. No. 2, Scotsburn; Vice-President, C. A. Sutherland, Plainfield; Secty.-Treasurer, C. R. McKay, Elmfield; Directors: W A Graham, H. M. McKenzie, R. R. No. 1, Scotsburn, Charles Sutherland, James McKay, Daniel McKay, R. R. No. 2, Scotsburn ....

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Total
37	41 50	40 62	111 17	105 25	5 92
37	63 00	49 67	141 66	114 87	26 79
18	41 50	40 62	155 67	146 52	9 15
31	60 25	48 50	111 30	106 30	5 00
37	84 00	58 49	340 39	111 47	228 92
23	44 00	41 68	New	Society	

Lismore.—President, Stephen McDonald, Lismore; Vice-President, John D. McKinnon, Lismore; Secty.-Treasurer, John H. McDonald; Directors: W. C. McKinnon, Alex. J. McDonald, John M. McDonald, Roddie McDonald, Lismore; George R. McDonald; Auditors: John McGillivray, Stephen McDonald, Lismore.........................

Little Harbor.—President, Alex Reid, Little Harbor; Vice-President, J. C. Reid, Little Harbor; Secty.-Treasurer, Alex. McQueen, King's Head; Directors: Joseph Milligan, John McDonald, Robert W. McQueen, Robie D Grant, King's Head; Wm. M. Wilson, Little Harbor; Auditors: John D. Grant, D.P. McDonald, King's Head............

Lyon's Brook.—President, C. D. Gammon, Lyon's Brook; Vice-President, J. R. Hislop, Lyon's Brook; Secty.-Treasurer, G. Wm. Grant, Lyon's Brook; Directors: A. D. McKay, Peter McInnis, Finlay McIntosh, R. Fullerton, Wm. Brown, Pictou; Auditors: A. D. McKay, Pictou; Peter McInnis, Lyon's Brook........................

Marshville.—President, James B. Langille, Marshville; Vice-President, Robt. McKay, Marshville, Clarence W. Langille, Marshville; Directors, Hope W. Langille, Carl Langille, William Tattrie, Amos Tattrie, Calvin Langille, Marshville; Auditors: Clifford D. Langille, Rod. McDonald, Marshville.....................................

Maxwelton, President, George W. MacKay, Lower Barney's River; Cice-President, C. R. Smith, C. Ponds, George D. Smith, Ponds; Directors: James W. Arbuckle, A. R. Murdock, George D. Smith, Ponds; A. W. Miller, David Patterson, Lower Barney's River; Auditors: George W. Thompson, Ponds; R. MacG. Patterson, Lower Barney's River...

Meadowville.—President, A. R. MacConnell, Meadowville Station; Vice-President, Murdock Murray, Meadowville Station, Secty.-Treasurer, James H. Murray, Meadowville Station; Directors; James B. MacDonald, Wilson MacConnell, James W. MacBain, James Cotter, John D. MacConnell, Meadowville Station; Auditors: James W. McBain, Wilson MacConnell, Meadowville Station..............

Merigomish.—President, W. B. McDonald, West Merigomish; Vice-President, Wm. Craigie, Merigomish; Secty-Treasurer, David Finlayson, Merigomish; Directors: Samuel Cameron, William McGregor, Williard Copeland, George Roy, Renwick Forbes, Merigomish..................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
19	43 25	41 36	93 39	139 10	45 71
30	60 00	48 40	211 54	199 06	12 48
29	62 00	49 24	202 77	208 70	5 93
15	50 50	44 40	179 63	232 00	52 37
23	40 00	40 00	90 13	51 00	39 13
21	40 00	40 00	87 33	39 12	48 21
19	40 00	40 00	101 15	70 45	30 70

Mill Brook.—President, Hector McKenzie, New Gairloch; Vice-President, Wm. McDonald, Lime Rock; Secty., A. J. McIntosh, Mill Brook, Treasurer, Samuel Gordon, Mill Brook; Directors: David Ferguson, New Gairloch; W. H. Fraser, W. T. Fraser, J. L. Munro, Mill Brook; J. W. McDonald, Lovat..............................

Mount Thom.—President, W. D. McDonald, Salt Springs; Vice-President, J. D. Sinclair, Salt Springs; Secty.-Treasurer, D. R. Fraser, Salt Springs; Directors: C. A. Maxwell, David Cameron, Charles Fraser, W. C. Proudfoot, Salt Springs; Colin MacGillivray, Mt. Thom; Auditors: W. D. Maxwell, N. E. Fraser, Salt Springs;.............

New Glasgow.—President, John W. McDougall, New Glasgow; Vice-President, E. A. Fraser, New Glasgow; Secty-Treasurer, James R. Fraser, New Glasgow; Directors, Alex. Logan, John R. McMillan, New Glasgow; Falconer McDonald, Alma; S. N. Turner, R. McG. Murray, New Glasgow; Auditors: Don F. Fraser, Peter McFarlane, New Glasgow..

Pictou.—President, William A. McDonald, Bay View; Vice-President, Wm. D. Smith, Pictou; Secty.-Treasurer, D. Logan, Pictou; Directors: Gordon McKenzie, Waterside;? John McKeil, Bayview; Hugh Sutherland, Peter Watt, Mercer Murray, Pictou; Auditors: Peter Fraser, E. L. Armstrong, Pictou..................................

Pictou Island.—President, Chas. McCallum, Pictou Island; Vice-President, John McDonald, Pictou Island; Secy Treasurer, Laughlin Rankin; Directors: Hector McDonald, T. McLean, Robt. McFarlane, William McLean, Pictou Island..

Pine Tree.—President, R. T. King, Sutherland's River; Vice-President, Duncan Robertson, Thorburn; Secty.-Treasurer, Thomas Beveridge, Pine Tree; Directors: E. Benson, Pine Tree; J. H. Cameron, Thorburn; J. Simmonds, Sutherland's River; W. P. Reid, Thorburn; D. Burns, W. Merigomish; Auditors: J. Simmonds, Sutherland's River; W. P. W. P. Reid, Thorburn..............................

River John.—President, J. R. Coter, River John; Vice-President, H. H. Sellers Hodson; Secty-Treasurer, Wm. McGregor, River John; Directors: H. M. Tattrie, Bruce Langille, James Sellers, River John; Leander Creelman, Seafoam, W. J. McLean, Hedgeville; Auditors: A. D. Baillie, D. W. Cameron, River John..............................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
35	80 00	56 80	171 42	165 00	6 42
24	42 70	41 12	146 71	81 20	65 51
55	100 75	65 52	283 21	233 35	49 86
141	195 50	105 33	706 85	626 43	80 42
18	40 00	40 00	100 15	31 00	69 15
28	59 75	48 30	163 55	100 05	63 50
57	110 25	69 52	261 85	277 50	15 65

Rockdin.—President, Ernest Fraser, Rocklin; Vice-President, Geo. T. Kerr, Burnside; Secty., Geo. W. McLeod, Burnside; Treas., John G. Sutherland, Burnside; Directors: Daniel Balfour, John R. Collie, Rocklin; John T. Kerr, Charles Jordan; John G. Sutherland, Burnside; Auditors: John T. Kerr, John G. Sutherland, Burnside..............

Rogers Hill.—President, Wm. Carson, Rogers Hill Centre; Vice-President, George W. McKenzie, Cross Roads, Rogers Hill; Secty.-Treasurer, W. S. McKean, Scotsburn Station; Directors: John A. McKean, Rogers Hill Centre; Wm. E. Murray, Scotsburn Station; John Stewart; George W. McKenzie, Cross Roads, Rogers Hill; Auditors: K. C. Fraser, Cross Roads, Rogers Hill.......................

Salt Springs.—President, Fred Setchell, R. R. No. 1, Saltsprings; Vice-President, K. A. Murray, R. R. No. 1, Saltsprings; Secty.-Treasurer, R. A. Robertson, R. R. No. 1, Saltsprings; Directors: J. R. Young, D. R. Robertson, Harry Brown, T. B. Maurland, R. R. No. 1, Saltsprings.....

Scotsburn.—President, Duncan Murray, Scotsburn; Vice-President, Hugh J. McLeod, Healthbell; Secty.-Treasurer, D. W. Murray, Scotsburn; Directors: Alex. McLeod, Robert Douglas, Heathbell; Rod J. Smart, Alex. McKay, A. G. Stewart, Scotsburn; Auditors: Robt. T. Stewart, Hugh Stewart, Scotsburn...........................

Seaview.—President, D. R. MacGillivray, Dunmoglass; Vice-President, R. H. MacGillivray, Dunmoglass; Secty.-Treasurer, D. R. MacKinnon, Ardness; Directors: Angus McEachern, Ardness; Angus B. MacGillivray, R. A. MacGillivray, Dunmoglass; Auditor: A. J. MacGillivray, Dunmoglass..

Strathshield.—President, John J. McKinnon, Bailey's Brook; Vice-President, Dan W. McLean, Bailey's Brook; Secty.-Treasurer, D. L. McDonald, Bailey's Brook; Direc-Duncan D. McLean, Bailey's Brook; Hugh C. McDonald, tors, Duncan D. McLean, Bailey's Brook; Allan A. MacGillivray, Glen; Donald W. MacGillivray, Bailey's Brook, Hugh J. McDonald; Auditors: Rod W. McGillivray, Dan W. McLean, Bailey's Brook..........................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
15	40 00	40 00	172 40	119 40	53 00
31	61 00	48 83	241 32	96 97	144 35
16	45 00	42 09	126 49	130 25	3 76
25	50 00	44 20	217 63	103 37	114 26
16	43 00	41 26	180 75	233 83	53 08
29	46 40	42 69	146 10	136 90	9 20

Toney River.—President, John A. Coloquhoun, Toney River; Vice-President, James Elliott, Toney River; Secty-Treasurer, Daniel A. McKenzie, Toney River; Directors: Angus C. Grant, Daniel McDonald, Angus L. Henderson, Toney River; John D. Munroe, Toney Mills; Daniel D. McKenzie, Toney Mills; Auditors; John D. Henderson, G. R. McConnell, Toney Mills..............................

Union Centre.—President, Duncan Fraser, R. R. No. 2, Union Centre; Vice-President, John G. Munro, Union Centre; Secty., Alex. Ross, R. R. No. 2, Westville; Treasurer, Warren Mackenzie, Union Centre, Directors: John McNeil, Westville; George Ross, Wm. Harris, Union Centre, John Crawford, Westville; Wm. Gray, Union Centre; Auditors: John Munro, Union Centre; John Crawford, Westville.

West Branch.—President, J. W. Ross, West Branch; Vice-President, J. R. Murray, West Branch; Secty., Murdoch Sutherland, West Branch; Directors: Hugh McLean, James Graham, Warren Rae, George Urquhart, Hugh R. Ross, West Branch; Auditors: H. D. McKenzie, Thomas Harbourne, West Branch..............................

West River.—President, A. H. Clark, R. R. No. 2, Pictou; Vice-President, John F. Proudfoot, R. R. No. 1, West River Station; Secty.-Treasurer, W. O. Creighton, R. R. No. 1, West River Station; Directors: George Stewart, R. R. No. 2, Pictou; Scott Grant, R. R. No. 1, West River Station; George Brown rigg, R. R. No. 2, Pictou; Stewart McLellan, R. R. No. 2, Pictou; Stewart McLellan, R. R. No. 2, Pictou; WilliamMcLean, R. R. No. 1, West River Station...

West River Station.— President, William Graham West River Station; Vice-President, Rod MacDonald, West River Station; Secty.-Treasurer, K. M. Ross, West River Station; Directors: William Tupper, George Baillie, George McBeth, West River Station, Neil Matheson, Watervale; Simon Fraser, West River Station..............................

Westville.— President, R. C. Munroe, Westville; Vice-President, W. Fraser, Westville; Secty., J. K. McKenzie, Westville; Treasurer, Alfred McLeod, Westville; Directors: James McQuarrie, M. McLeod, J. W. McLeod, James McCoull, G. Oliver, Westville..............................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
21	44 50	41 90	171 19	37 45	133 74
20	42 74	41 15	90 02	40 85	49 14
46	140 50	82 23	150 17	174 00	23 83
15	49 00	43 78	253 15	106 15	147 00
17	51 00	44 61	New	Society	
36	43 00	41 26	194 34	83 30	66 04

QUEENS COUNTY

Kempt —President, M U Freeman, Kempt; Vice-President, Robert Lewis, Kempt; Secty -Treasurer, H J Freeman, Kempt; Directors: Samuel Luxton, Robt Atkins, Atkins, Willard Freeman, Ernest Kempt; Auditors: Rueben Cushing, New Grafton; Whitman Freeman, Kempt ......

Mutual Benefit —President F. C. Hunt, North Brookfield; Vice-President, H. L. Dailey, North Brookfield; Secty.-Treasurer, R. F. Wear, North Brookfield; Directors: Stephen Fancey, H. L. Dailey, Judson Christopher, S. Wile, H. Silver, North Brookfield; Auditors: S. Fancey, N. W. Frank, North Brookfield..............................

North Queens.—President, G W. Rafuse, Caledonia; Vice-President, Z. F. Minard, Harmony; Secty., J. W Douglas, Caledonia; Directors: Owen Seldon, Melburne Kempton, H. S. Annis, Wilson Baxter, Zoeth Minard, Caledonia.......

Pleasant River.—President, George Herman, Pleasant River; Vice-President, S. L. Waterman, Pleasant River; Secty.-Treasurer, Freeman Waterman, Pleasant River; Directors: Lloyd Colf, Henry Wile, Sylvenas Veinot, Wilson Freeman, Nathaniel Colf, Pleasant River; Auditors: A. M. Frank, Maynard Colf, Pleasant River..............

South Brookfield.—President, J. W. Smith, South Brookfield; Vice-President, H. L. Spidle, South Brookfield; Secty., Josiah Smith, South Brookfield; Directors: Charles Cameron, W. L. Freeman, L. A. Crooker, Charles Spears, Robert Smith, South Brookfield............................

RICHMOND COUNTY.

Arichat.—President, Rev. Geo. A. Andrew, Arichat; Vice-President, Reynolds Smith, Arichat; Secty.-Treasurer, James D. Power, Arichat; Directors: M. B. McNeil, Charles S. Malzard, Philip J. Fiott, E. C. Doyle, John Tyrell, Arichat...

Arichat East.—President, Dr. A. B. LeBlanc, Arichat; Vice-President, Alcide Goyetch, Cape Auguet; Secty., Charles Marchand, Arichat; Directors: A. D. Sampson., Alex. Edward, Arichat; Arthur Briand, Pondville; Needie Deroche, Arichat; Francis Edward, Pondville; Auditors: A. F. Brodeau, Brodeauville; William Dumphy, Pondville.

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
35	40 50	40 21	225 07	155 71	69 36
47	144 32	83 80	185 75	240 09	54 34
27	40 50	40 21	94 85	134 74	39 89
25	42 00	40 84	New	Society	
45	60 00	48 40	108 10	102 97	5 13
52	70 00	52 60	109 75	98 07	11 68
80	86 00	59 33	New	Society	

Barra Head.—President, Rev. R. L. McDonald, St. Peters; Vice-President, James E. Harris, Barra Head; Secty.-Treasurer, Ernest McNeil, Barra Head; Directors: James Cameron, Henry Langley, John D. McNeil, Dan B. McLean, Alex. McDonald, Barra Head; Auditors; Wm. A. McDonald, John Arsebault, Barra Head..........................

Descousse.—President, Rev. Wilfred A. Bouchie, Descousse; Vice-President, Pascal Poirier, Descousse; Secty.-Treasurer, Jeffry H. Poirier, Descousse; Directors: Edward Doyle, Poulamond; Peter Dunn, Felix Landry, Descousse; Louis L. Pertus, Poulamond, Elias L. McDonald, Descousse; Auditors, Capt. Simon Joyce, A. A. LeBrun, Fred J. Poirier, Descousse....................................

Grand Anse.—President, D. D. Buchanan, Grand Anse; Vice-President, M. J. MacDonald, Grand Anse; Secty.-Treasurer, D. A. MacRae, Grand Anse; Directors: Murdock MacPherson, Dan Ferguson; Dan H. MacDougalld, George J. Hill, Malcolm MacPhail, Grand Anse; Auditors: John A. MacRae, Balmoral; George MacDonald, Grand Anse...

Grand River.—President, Dan J. Matheson, Grand River; Vice-President, Alex, R. Urquhart, Grand River; Secty.-Treasurer, Alex. G. MacKay, Grand River; Directors: Alex. D. MacKay, John F. McCuspic, R. C. Matheson, Archie C. McBeth, Grand River; Rod McDonald, St. Esprit; Auditors: John F. Matheson, John L. McAulay, Grand River...................................

Louisdale.—President, Edmund Sampson, Louisdale; Vice-President, J. Scott Nelson, Louisdale; Secty., Rennie Sampson, Louisdale; Treasurer, Ben Marchaud, Jr., Louisdale; Directors: Henry Sampson, Alfred Sampson, Alfred Sampson, Thomas Joyce, Helair Sampson, John Kavanagh, Louisdale......................................

Petit De Grat.—President, Capt. Sylvester Boudreau, Petit De Grat; Vice-President, Elias V. Landry, Petit De Grat, Secty.-Treasurer, John A. Landry, Petit De Grat; Directors: Daniel C. Samson, Hiliare Blois, Edward Landry, Chas. P. Boudreau, Petit de Grat; Sylvester Samson, Lower Anse; Auditors: Robert Martell, Hugh Clemon, Petit De Grat...

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
27	57 00	47 14	New	Society	
114	183 00	100 07	New	Society	
18	41 00	40 42	94 81	39 35	55 46
20	40 00	40 00	204 45	140 75	63 70
45	45 00	42 10	New	Society	
74	74 00	54 28	New	Society.	

Soldier's Cove—President, R. L. McDonald, Soldiers Cove; Vice-President, John J. McDonald, Soldiers Cove; Secty.-Treasurer; Stephen T. Thomas, Soldiers Cove; Directors: Allan H. McDonald, Alex. A McDonald, William McDonald, John F. Gillis, William Sutherland, Soldiers Cove; Auditors: Martin Gillis, Peter McKenzie, Soldiers Cove..

West Arichat—President, Benjamin Sampson; West Arichat; Vice-President, John B. Gerrior, West Arichat; Arichat; Secty., Henry L. Doiron; Asst. Secty.-Treasurer, J. Hubert Poirrior: Directors: Rev. J. Ed. Robitaille, P. P. West Arichat; Hugh McEachern, Port Royal; Charles Forrest, Daniel Briand, James McDonald, West Arichat...

West Bay.—Peter Dunphy, St. George's Channel; Vice-President, Duncan J. McRae, St. George's Channel; Secty., F. C. Cotton, St. George's Channel; Treasurer, Peter Dunphy; Directors: Wm. Campbell, Points, West Bay; W. H. Ross, John D. McRae, W. S. Urquhart, Ben. McKenzie, St. George's Channel; Auditors: Dan Cameron, John W. McRae, St. George's Channel...................

SHELBURNE COUNTY.

Barrington.—President, D. Sargent, Barrington Passage; Vice-President, J. W. Robertson, Barrington Passage; Secty-Treasurer, F. W. Sargent, Crowell: Directors: J. R. Gammon, Geo. W. Smith, J. H. Christie, Barrington Passag;e Gilbert Crowell, W. L. Smith, Crowell; Auditors: D. Sargent, Geo. W. Smith,..............................

Granite.—President, A. M. Wilson, Barrington; Vice-President, L. Davis, Barrington; Secty., Stanley Doane, Barrington; Treas., Joseph Hipson, Barrington; Directors: J. McMullen, L. Davis, J. Homer, W. H. Doane, J. McKenna, Barrington; Auditors: J. Homer, F. Watt, Barrington.

Shelburne.—President, H. A. Harris, Welshtown; Vice-President, Lorenzo Jones; Upper Ohio; Secty.-Treasurer, W. K. Hood, Shelburne; Directors: Henry W. Bower; F. W Bower, Lower Ohio; W. I. Farquhar, Dr. L. O. Fuller, Angus Swansburg; Auditors: F. C. Blanchard, Angus Swansburg...

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
25	49 00	43 78	145 99	143 45	2 54
41	41 00	40 42	New	Society	
26	59 00	47 98	112 46	44 00	68 46
43	57 25	47 24	218 58	178 00	40 58
68	76 00	55 12	234 97	210 01	24 96
99	99 00	64 78	911 08	811 54	99 54

VICTORIA COUNTY.

Baddeck Bridge.—President, M. F. McRae, Baddeck Bridge; Vice-President, Miles McInnis, Baddeck Brisge, Secty. Treasurer, A. F. McRae, Nyanza; Directors: Angus McCharles, Baddeck Bridge; W. A. Hunter, A. J. Lain, John A. McDonald, Hunters Mountain; Angus McKay, Badeeck Bridge.................................

Baddeck Valley.—President, James T. Keiley, Baddeck Bridge; Vice-President, Dan McInnis, Forks, Baddeck; Secty.-Treasurer, M. R. McLeod, Baddeck Bridge; Directors Duncan Gillis, Duncan Buchanan, Dave McKenzie, Alex. McAulay, Forks, Baddeck; Colin Nicholson, Baddeck Bridge Auditors: Farquhar Buchanan, John Rice, Forks Baddeck.

Cape North.—President, Arch. MacDonald; Vice-Pres-President, Duncan MacDonald, Secty.-Treasurer, N. M. MacDonald; Directors: Angus M. McKinnon, Arthur MacAvoy, J. D. Morrison, V. E. Harris, A. J. Zwicker; Auditors: J. H. Campbell, Kenneth McKinnon.

Iona.—President, Rev. Roderick McKenzie, P P., Iona; Vice-President, Dan A. McDonald; St. Columba; Secty.-Treasurer, John R. Campbell, Jamesville West; Directors: James A. McNeil; Gillies' Pt., Rory McNeil, Iona; John T. McKinnon's Harbor Paul McKinnon, Barra Glen, Neil P. McLean, Washabuck Centre; Auditors: Edward McNeil, George McNeil; Iona...................

Lakeview.—President, James C. McDonald, Baddeck; Vice-President; George R. Anderson; Secty.-Treasurer, John E. Campbell, Baddeck; Directors: E. G. McAskill, A. Y. McDonald, Alex. McPherson, Henry M. Crowdis, A S. McDonald, Baddeck; Auditors: G. F. McRae, A. S. McDonald, Baddeck...................................

Middle River.—President, Forbes McDonald, Upper Middle River; Vice-President, John A. McDonald, Upper Middle River; Secty.—Treasurer, D. McLennan, Upper Middle River; Directors: George E. Ingraham, Kenneth Finlayson, R. J. McRae, Upper Middle River; Dan McDermid, Middle River; Rory McLeod, Upper Middle River; Auditors: Rory J. McLeod, Upper Middle River; Dan McDermid, Middle River................................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance
15	51 00	44 62	211 28	216 45	5 17
22	50 50	44 40	138 31	176 60	39 29
50	50 00	44 22	New	Society	
65	106 00	67 73	New	Society	
28	56 00	46 72	180 60	78 25	102 35
17	42 50	41 05	143 30	78 27	65 03

St. Anne's.—President, John C. McLeod, South Gut; Vice-President; A. G. Morrison, South Gut; Secty., M. H. Matheson, Glen Tosh; Treasurer, John A. McLeod, North Gut; Directors: Neil D. Carmichael, Big Hill, Duncan Smith Rod W. McLeod, Don Smith, John M. Buchanan, South Gut..

YARMOUTH COUNTY.

Brookside.—President, John Smith, East Pubnico; Vice-President, Eben Nickerson, East Pubnico; Secty.-Treasurer, Chas. S. Wyman, East Pubnico; Directors: Thomas Adams, Lorn Smith, East Pubnico; Arthur D'Entremont, Middle West Pubnico, Lawrence Amiro, George Fox, East Pubnico; Auditors: Capt. James Larkin, George Fox, Loran Smith, East Pubnico ....

Kemptville.—President, Harry C. Prosser, Kemptville; Vice-President, Arthur L. Roberts, Kemptville; Vice-Presi-Secty.-Treasurer, A. M. Gates, Kemptville ; Directors : C. C. Roberts, David Randall, Kemptville; Floyd Ring, North Kemptville; Silvanus Crowell, East Kemptville; Auditors: Jonathan Randall, William Goodwin, Kemptville..........

Yarmouth Central: President, R. C. Wyman, R. R. No. 2, Ohio; Vice-President, E. E. Porter, R. R. No. 2, Ohio; Secty.-Treasurer Geo. C. Killam, Pleasant Valley; Directors; S. F. Killam, Pleasant Valley; Alvin A. Crosby, Everett Gray, T. W. Roberts, L. E. Crosby, R. R. No. 2, Ohio; Auditors: Emory E. Porter, Alvin A Crosby.........

Yarmouth County.—President, E. K. Spinney, Yarmouth; Vice-President, S. A. Cook, Yarmouth; Secty.-Treasurer, Wm. Corning, Yarmouth; Directors: J. J. Lovitt, J. M. Porter, J. F. Palmer, John C. Corning, Walter Churchill, Yarmouth; Auditors: W. A. Godfrey, W M. Kelley, Yarmouth..

Yarmouth Township.—President, Moses Harris, Hebron, Vice-President, J. A. McCormack, Wellington; Secty., W. A. Churchill, Lakeside; Treasurer, Asa Porter, Hebron; Directors: Chas. Porter, Thos. Moses, Chas. Rogers, Edward McCormick, Fred Crowell, Hebron..........................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
20	40 00	40 00			
48	69 75	52 48	219 52	124 29	95 23
80	172 00	95 45	391 97	366 60	25 37
16	41 50	40 62	236 98	175 95	61 03
400	629 25	250 00	4720 35	3657 74	1062 61
42	133 00	79 08	589 01	63 35	525 66

REPORT OF STANDING FIELD CROPS COMPETITION FOR 1915.

I think that it is safe to assert that no branch of Agriculture has made as rapid progress as has been accomplished through the use of improved seed.

The Canadian Seed Growers' Association, the Seed Control Act, the Inspectors appointed by the Federal Department of Agriculture, and Seeds Fairs have all been potent factors in bringing about this desirable condition of our agricultural affairs.

Yet those familiar with the facts admit that much of the credit of impressing the real value of improved seed on the average farmer is due to the Field Crops Competition.

Although the season was not favorable to the growth of some crops, the entries were large and the results decidedly satisfactory.

The Competition was conducted along the same lines as last year except in the Potato Competition the Province was divided into five districts instead of four, and six instead of two counties had Turnip Competitions.

The total amount of prize money paid out was $2540.60, divided as follows:

Wheat	$ 468.46
Oats	829.10
Potatoes	193.08
Turnips	1050.00

The number of entries were: Wheat, 95; Oats, 174; Potatoes, 52; Turnips, 64; making a grand total of 385 and an increase of 55 over the previous year. The highest score in the wheat competition was 97¼ points made by A. Scott McDonnell, of Port Hood, and the highest score in the Oats Competition was 96½, made by A. J. Campbell, Beatonville.

In the Potato Competition, the Province was divided as follows:

District No. 1, Digby, Yarmouth, Shelburne and Queens.
" " 2, Annapolis, Kings, Lunenburg and Hants.
" " 3, Colchester, Cumberland and Pictou.
" " 4, Halifax, Guysboro and Antigonish.
" " 5, Victoria, Cape Breton, Inverness and Richmond.

Competitions were held in four districts, District No. 1, failed to make the required number of entries.

Notwithstanding a general failure in the potato crop, some excellent fields were found. All the entries in District No. 2 were in Lunenburg County and it was here the best fields in the Province were found. From later reports I learn that all the prize winning fields in that county yielded upwards of 300 bushels of potatoes per acre and the first prize field yielded 550 bushels per acre. Such yields in a year when this crop was a comparative failure are an impressive lesson of what can be accomplished by proper treatment. In fact it bears out the statement made by Prof. G. C. Cunningham, Dominion Plant Pathologist, at the recent meeting of the Nova Scotia Farmers' Association, that all of our most troublesome potato diseases can be successfully combated by selection and spraying.

The Turnip Growing Competition was started in 1912 by a former Nova Scotian residing in New York, offering four prizes for the best acre of turnips grown by a boy between the age of 15 and 20 years for Cumberland and Colchester Counties. This work was carried on by this gentleman alone for two years. The Department of Agriculture then offered to provide one-half the amount necessary for a competition in any county if the balance was raised by private subscription.

Last year Pictou County came in and this year there were six counties in the Competition. Guysboro and Inverness were provided for by the man who started the Competition; Antigonish had a Competition through the generosity of D. G. Kirk. The Federal and the two Provincial representatives looked after Pictou County. Several members of the Halifax Board of Trade produced the necessary funds for Halifax County, and A. E. Davidson and John J. Davidson, of New York, Barry P. Hill and James Fulton, of Bass River, and others contributed the required amount for a Competition in Colchester County.

Although the season was unfavorable for the growth of this crop, the results were satisfactory.

It is worthy of note that the best fields of turnips in the counties where Competitions were held were those in the Boys' Competition. The following pages contain a list of competitors and scores made by each.

Respectfully submitted.

F. L. FULLER.

WHEAT.

ANNAPOLIS COUNTY.

Name of Competitor	Address	Variety.
V. B. Leonard	Central Clarence	Red Fife
Arthur Phinney	R. R. No. 4. Bridgetown	White Russian
T. E. Smith	Central Clarence	Red Fife
E. J. Shaffner	Lawrencetown	White Russian
Chas. Foster	Clarence	Red Fife
E. J. Elliott	Clarence	Red Fife

ANTIGONISH COUNTY.

Name of Competitor	Address	Variety.
Jas. Dunn	Lr. South River	White Russian
Ronald Chisholm	Briley Brook	White Russian
Thomas Hogan	Harbour Road	White Russian
Wm. Chisholm	Harbour Road	White Russian
Ronald W. Chisholm	Glen Road	White Russian
John McLean	Addington Forks	White Russian
D. R. Henderson	Copper Lake	White Russian
Angus R. Boyd	Morristown	White Russian
Alex. C. Chisholm	North Grant	Red Fife
Henry Baxter	Addington Forks	White Russian
Daniel Duggan	Beech Hill	Red Fife

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total
5	10	5	25	10	20	20	5	100
5.	9.5	4.75	23.	9.	18.5	18.5	4.75	94.
4.5	9.	5.	22.	10.	15.	18.	4.5	88.
4.25	8.	5.	22.	9.5	18.	16.	4.75	87.5
4.5	9.	5.	24.	9.5	13.	17.5	4.5	87.
4.75	9.5	4.75	22.	10.	12.	18.	5.	86.
4.5	9.5	4.75	22.	10.	10.	18.	4.75	83.5
4.75	9.	4.5	22.	9.5	20.	18.	4.5	92.25
5.	7.5	4.5	23.5	9.5	20.	17.	5.	92.
4.5	8.5	5.	22.5	10.	18.5	17.	5.	91.
4.5	9.5	5.	24.	9.5	15.5	17.	5.	90.
4.5	9.5	5.	23.	9.75	15.	18.	4.75	89.5
5.	9.	4.	23.	8.75	16.	18.5	5.	89.25
4.75	8.5	5.	24.	9.5	16.	16.5	4.75	89.
4.5	9.	4.5	21.	9.5	19.	16.5	4.75	88.75
4.5	7.	4.75	24.	9.5	20.	14.	4.5	88.25
4.5	8.	4.25	21.	9.5	18.5	17.	5.	87.75
4.5	8.5	5.	22.	10.	18.	15.	4.75	87.75

Name of Competitor	Address	Variety.
Dougald A. Cameron..	Loch Katrine.....	White Russian...
Alex. McDonald......	Doctor's Brook....	Red Fife........
Thomas McDonald....	Antigonish........	White Russian....
Alex. J. Chisholm.....	Box303Antigonish	White Russian...
Dan Chisholm........	Glen Road.......	White Russian...
P. J. Hanrahan.......	Fairmont.........	White Russian...
D. M. Cameron......	Fairmont.........	White Russian...
D. L. Gillis..........	Doctor's Brook....	White Russian...
John A. Cameron.....	Loch Katrine.....	White Russian...
P. D. Hanrahan......	Fairmont.........	White Russian...
Colin McNeil.........	Fairmont.........	White Russian...
Cameron Chisholm....	Salt Springs......	White Russian...
John A. McDonald....	Briley Brook (Post Road)	White Russian...

CAPE BRETON COUNTY.

E. J. Johnston........	George's River....	White Russian...
W. H. Kelly..........	George's River....	White Russian...
A. W. Gillis..........	George's River....	White Russian...
Rev. J. W. McIssac...	East Bay.........	

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total
4.5	7.5	5.	24.	10.	16.	16.	4.5	87.5
4.5	9.	5.	24.	8.	17.	15.	5.	87.5
4.5	8.	4.5	23.	9.	18.	15.	4.5	86.5
4.5	7.5	4.75	22.	10.	16.	17.	4.5	86.25
5.	9.	4.5	20.	10.	15.	18.	4.75	86.25
4.5	7.5	5.	22.	10.	16.	16.	5.	86.
4.25	6.5	4.5	23.	9.5	17.5	16.	4.5	85.75
4.5	8.	5.	23.	10.	13.	17.	5.	85.5
4.75	9.	4.5	21.	10.	14.	17.	4.75	85.5
4.5	7.5	4.5	21.	10.	17.	16.	4.5	85.
4.25	6.5	4.5	21.	9.5	17.	16.	4.5	84.75
5.	7.	4.5	20.	9.5	18.	15.	5.	84.
4.25	9.	4.5	21.	9.5	15.	16.	4.75	84.
4.75	8.5	4.75	23.5	10.	18.	15.	4.5	89.
4.25	7.	5.	25.	10.	17.	15.	5.	88.25
4.25	8.5	4.75	21.	10.	19.	15.	5.	87.5
4.	9.5	4.	23.	9.75	16.	16.	5.	87.25

Name of Competitor	Address	Variety.
John McMullen......	George's River....	Red Fife........
Rod. McLeod........	Grove's Point.....	White Russian...

COLCHESTER COUNTY.

Name of Competitor	Address	Variety.
J. R. Semple.........	R.R. No. 1, Tatamagouche.	Red Fife........
J. L. Cunningham....	Bayhead........	White Russian...
J. W. Murray........	Balmoral Mills....	Red Fife........
R. D. McKay........	Balmoral Mills....	Red Fife........
Jas. R. Hogan........	Denmark.........	White Russian...
Blair Cutten.........	Lower Truro......	Red Fife........
Alex. Ross...........	East Earltown....	Marquis..........
Wilmot L. Fulton.....	Lower Stewiacke..	Marquis..........
Earl Jennings........	Masstown........	White Russian...

CUMBERLAND COUNTY.

Name of Competitor	Address	Variety.
W. L. McFarlane.....	Fox Harbour......	Red Fife.........
Herbert Atkinson.....	Maccan...........	Red Fife........
C. C. McFarlane......	Fox Harbour......	Red Fife........
John R. Harrison.....	Maccan..........	White Russian...
L. G. Stevens........	Wallace Grant....	White Russian...
M. B. Harrison.......	Maccan..........	Marquis.........

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total
4.25	8.	4.75	21.	9.75	19.	16.	4.75	87.
4.5	10.	4.5	22.	9.5	14.	17.	5.	86.5
5.	9.5	4.25	24.25	9.5	20.	18.	4.5	95.
4.75	9.25	4.5	24.	10.	19.5	18.	4.75	94.75
4.25	9.	4.5	19.5	9.75	20.	17.5	4.75	89.25
4.	8.	4.75	20.5	9.5	20.	17.5	4.75	89.
4.25	8.5	4.75	22.5	9.5	16.	17.	4.75	87.25
4.25	9.	3.	23.	9.	16.5	17.5	4.5	86.75
4.	8.	4.5	21.5	10.	16.	16.	4.5	84.5
4.	8.5	4.	17.5	9.5	18.5	16.5	4.75	83.25
4.	8.25	3.	20.5	9.	16.	17.	4.5	82.25
4.5	9.	5.	21.25	9.75	20.	18.	4.75	92.25
4.75	9.75	5.	22.	9.5	18.5	17.6	4.9	92.
4.	8.5	5.	21.75	9.75	20.	18.	4.5	91.5
4.5	9.4	5.	22.	9.25	18.	17.5	4.6	90.25
4.5	9.	4.9	21.5	9.8	16.5	18.	4.8	89.
4.	8.2	4.75	21.5	9.75	17.5	17.	4.8	87.5

GUYSBORO COUNTY.

Name of Competitor	Address	Variety
John A. Sinclair......	Goshen..........	White Russian...
John A. McLean......	New Town.......	White Russian...
James W. McIntosh...	Goshen..........	White Russian...
John F. Forbes.......	Goshen..........	White Russian...
John McNeil.........	S. River Lake.....	White Russian...

HALIFAX COUNTY.

Name of Competitor	Address	Variety
Geo. Burris & Son....	U. Musquodoboit..	Red Fife........
Robt. S. McCurdy....	M. Musquodoboit.	Red Fife........
John Ogilvie.........	Elderbank........	Red Fife........
Adams Archibald.....	M. Musquodoboit.	Red Fife........
Robt. Kaulbach......	M. Musquodoboit.	Red Fife........
R. H. Reid...........	Brookvale........	Red Fife........
M. H. Guild.........	M. Musquodoboit.	Red Fife........

INVERNESS COUNTY.

Name of Competitor	Address	Variety
A. Scott McDonnell...	Port Hood........	Red Fife........
A. R. McDonald......	Broad Cove Chap.	White Russian...
Alex. Rankin.........	Judique..........	Red Fife........
Rev. John McLennan	Glendale.........	
A. T. Beaton.........	Brook Village.....	

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total
4.75	10.	4.	23.	9.	17.	18.	4.5	90.25
5.	10.	4.5	22.	8.5	17.	18.	5.	90.
4.75	9.5	4.5	23.	9.5	16.	18.	4.5	89.75
4.	8.	5.	23.	10.	17.	16.	5.	88.
3.	8.	4.	22.	10.	16.	15.	5.	83.
4.75	9.	4.75	23.	9.5	18.	18.	5.	92.
5.	9.5	3.5	24.	8.5	20.	17.	4.	91.5
4.75	9.25	3.75	24.5	8.	20.	17.	4.	91.25
4.75	9.	3.	22.	9.	19.	18.	4.25	89.
5.	9.	2.	24.	9.	20.	16.	4.5	89.5
4.75	9.5	4.25	22.	9.	15.	18.	5.	87.5
4.5	10.	3.5	22.	9.5	15.	17.	4.5	86.
4.75	10.	4.75	24.	10.	19.75	19.	5.	97.25
4.75	9.75	5.	23.	10.	18.	18.25	5.	93.75
4.5	9.25	5.	23.	10.	19.5	18.	4.	93.25
3.75	8.75	5.	25.	10.	18.	17.5	5.	93.
4.75	9.25	5.	23.	9.5	18.	18.	5.	92.5

Name of Competitor	Address	Variety
C. AuCoin...........	Belle Cote........	
B. J. Smith..........	Blackstone........	
Alex. R. McIssac.....	Inverness.........	
Alex. D. Cameron.....	Mabou...........	
Dan A. McIssac......	Inverness.........	
Eddy Smith..........	Blackstone.......	White Russian...
LUNENBURG COUNTY		
O. G. Dauphinee......	Bridgewater......	Red Fife........
Jas. Mader...........	Bridgewater......	Red Fife........
Chas. Wile...........	East Bridgewater..	Red Fife........
Levi Hebb...........	Bridgewater......	White Russian...
Artemas Joudrey.....	Bridgewater......	White Russian...
PICTOU COUNTY		
R. D. Ross...........	Bayview.........	White Russian...
Alex. McKay.........	Pictou...........	White Russian...
James Maxwell.......	Durham..........	White Russian...
H. M. Tattrie........	River John.......	Marquis.........
Calvin M. Langille....	Marshville........	White Russian...
C. D. Langille........	Marshville........	White Russian...

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, nd insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considerinp:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total
4.	9.25	5.	24.	10.	16.	17.	4.75	90.
5.	7.5	4.75	23.	10.	18.	16.	5.	89.25
4.25	9.25	4.	22.	10.	17.75	17.75	4.	89.
4.	9.	5.	22.	10.	17.5	17.	4.5	89.
3.75	9.5	4.5	23.	10.	17.25	16.	4.	88.5
4.5	9.5	2.75	22.	10.	18.5	17.	4.	88.25
5.	9.5	4.	22.	9.	19.	18.5	4.5	91.5
5.	9.5	5.	22.	9.	19.	17.	4.5	91.
5.	9.5	5.	22.	10.	15.	18.5	4.5	89.5
4.5	9.	5.	23.	9.5	11.	17.5	4.5	84.
5.	9.	4.75	15.	9.5	15.	18.	4.5	80.75
5.	9.5	5.	24.	9.5	20.	19.	5.	97.
5.	9.5	4.5	22.5	10.	20.	18.	4.5	94.
4.75	9.5	5.	23.	9.5	17.	18.	4.75	91.5
4.5	8.	5.	23.5	9.	19.5	17.	4.5	91.
4	8.5	5.	23.	9.5	17.5	17.	4.5	89.
3.5	7.	5.	21.	10.	15.	16.	4.	81.5

RICHMOND COUNTY.

Name of Competitor	Address	Variety.
John T. Johnston.....	Red Islands.......	White Russian...
Murdock McInnis....	St. George's Chan.	White Russian...
Reynolds Smith......	Arichat..........	Red Fife........
W. H. Ross..........	St. George's Chan.	White Russian...
Benj. McKenzie......	St. George's Chan.	White Russian...
Mrs. F. McInnis......	St. George's Chan.	White Russian...
Jas. H. McIntosh.....	Dundee..........	White Russian...
Jas. D. Calder........	St. George's Chan.	White Russian...
Arch. McCuish.......	Lochside.........	Red Fife........

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total
4.25	9.5	4.5	25.	10.	18.	16.	5.	92.25
4.25	9.	4.75	24.	10.	17.	16.	5.	90.25
4.5	9.	5.	23.5	10.	16.	16.	4.5	88.5
4.5	7.	5.	21.	10.	16.	14.	4.5	82.
4.	8.5	5.	24.	10	10.	15.	4.75	81.25
3.75	6.5	5.	21.	10.	18.	11.	4.5	79.75
3.5	7.5	5.	20.	10.	17.	12.	4.5	79.5
2.5	6.	4.	20.	10.	20.	8.	5.	75.5
1.	3.	5.	20.	10.	20.	5.	5.	69.

OATS.

ANNAPOLIS COUNTY.

Name of Competitor	Address	Variety.
E. J. Elliott..........	Clarence.........	White Banner....
L. W. Elliott..........	Clarence.........	White Banner....
V. B. Leonard........	Central Clarence..	White Banner....
Arthur Phinney.......	Bridgetown.......	Banner..........
T. E. Smith..........	Central Clarence..	Derby..........

ANTIGONISH COUNTY.

Name of Competitor	Address	Variety.
Ronald W. Chisholm..	Glen Road........	Banner..........
Crockett Bros........	Antigonish........	Banner..........
J. G. Taylor..........	Antigonish........	Banner..........
Mt. Cameron Farm...	Antigonish........	Banner..........
John A. McDonald....	Maryvale.........	Banner..........
Alex. J. Chisholm.....	Box 303, Antig.	Banner..........
Alex. H. McPherson...	U. South River....	Banner..........
Dougald A. Cameron..	Loch Katrine.....	Banner..........
Wm. C. McIntosh.....	L. South River....	Banner..........
D. R. Henderson.....	Copper Lake......	Banner..........
Colin McNeil.........	Fairmont.........	Old Island Black.
Thomas Hogan.......	Harbour Road....	Banner..........
John T. Keating.....	Lochaber.........	Banner..........

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total
5.	8.5	5.	24.	9.5	18.	17.5	4.5	92.
5.	8.5	4.75	23.	9	18.	17.5	4.75	90.5
4.5	9.5	4.5	22.	9.	18.	18.	4.5	90.
4.25	8.5	4.75	23.	9.5	18.	17.	4.5	89.5
4.25	8.	4.75	22.	9.5	18.	16.	5.	87.5
4.75	9.	4.75	25.	10.	20.	17.	4.75	95.25
4.75	9.25	4.	22.25	10.	20.	18.5	4.75	93.5
4.75	9.	4.75	25.	8.25	20.	16.	5.	92.75
4.75	8.25	4.75	24.	9.5	17.75	18.5	5.	92.5
4.75	7.5	4.5	24.	10.	20.	17.	4.5	92.25
4.5	8.	4.5	24.	9.5	20.	17.	4.5	92.
4.75	8.5	4.	25.	10.	20.	15.	4.5	91.75
4.75	9.	4.5	24.	10.	18.	16.5	4.75	91.5
4.5	8.	4.25	22.	10.	20.	18.	4.5	91.35
4.5	8.25	4.75	24.	10.	18.	17.	4.75	91.25
4.5	8.5	4.5	25.	9.5	18.	16.5	4.5	91.
4.5	8.5	4.5	23.	9.5	20.	16.	4.75	90.75
4.75	9.5	4.5	24.	10.	15.5	17.5	4.5	90.25

Name of Competitor	Address	Variety.
John T. Keating......	Lochaber.........	Banner..........
John C. Chisholm.....	Lr. South River...	Banner..........
John J. Chisholm.....	Malignant Cove...	Egyptian........
W. J. Walsh..........	Fairmont.........	Banner..........
Will Chisholm........	Harbour Road....	Banner..........
P. J Hanrahan.......	Fairmont.........	Old Island Black.
Cameron Chisholm....	Salt Springs......	Banner..........
John A. McMillan....	U. South River....	Banner..........
D. R. Chisholm.......	Pomquet River....	Banner..........
Jas. Thompson.......	Cloverville........	Banner..........
Jas. D. Hanrahan.....	Fairmont.........	Old Island Black.
Dougald McGregor....	U. South River....	White Oats......
John J. Cameron......	Fairmont.........	Sensation........
D. M. Cameron.......	Fairmont.........	Black Northern..
Dan. Chisholm.......	Glen Road........	Sensation........
John C. Chisholm.....	St. Andrews......	White Wave.....
John J. Inglis........	North Lochaber...	Banner..........
Wm. A. Chisholm.....	North Grant......	Banner..........
Alex. C. Chisholm.....	North Grant......	Banner..........

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total
4.	7.	5.	24.5	10.	20.	15.	4.5	90.
4.75	9.5	4.	23.	8.5	19.	16.	5.	89.75
5.	8.	4.5	21.	9.	20.	16.5	4.5	89.5
4.5	8.	5.	25.	7.	20.	15.	5.	89.5
4.5	8.5	4.5	25.	9.5	16.75	16.	4.5	89.25
5.	7.	4.5	23.5	9.5	20.	15.	4.5	89.
4.75	8.75	4.	24.	8.5	18.	16.	4.5	88.5
4.5	8.5	4.5	22.	8	20	16.	4.5	88.
4.5	6.	5.	25.	10.	17.	15.	5.	87.5
5.	7.5	4.5	23.	9.5	18.5	15.	4.	87.5
3.	9.	4.5	25.	6.5	20.	15.	4.5	87.5
5.	6.5	5.	24.5	9.5	18.	14.	4.5	87.
4.5	8.	4.75	23.	8.	18.	16.	4.5	86.75
4.75	7.5	4.75	22.	10.	18.	15.	4.75	86.75
4.75	7.5	4.75	22.	10.	18.	15.	4.75	86.75
4.5	9.	4.5	24.	8.	15.	17.	4.5	86.5
4.75	7.	4.75	25.	8.5	18.	14.	4.5	86.5
4.5	6.25	4.5	23.	8.5	20.	15.	4.5	86.25
4.5	6.	4.5	23.	10.	20.	13.	5.	86.

Alex. McDonald......	Doctor's Brook....	Banner..........
G. F. McDonald......	Middleton........	Banner..........
Rod Chisholm........	L. South River....	Banner..........
John A. Cameron.....	Loch Katrine.....	New Market.....

CAPE BRETON COUNTY.

Edward McLeod......	Big Pond.........	White Wave.....
Dan. A. McDonald....	N. Side East Bay..	Island Black.....
John McMullin.......	George's River....	Banner..........
Joe Campbell.........	Big Pond Centre..	Banner..........
M. E. McNeil........	Irish Cove........	Banner..........
W. H. Kelly..........	George's River....	Island Black.....
Jas. A. McLeod.......	Groves' Point.....	Black Fox Tail...
M. P. McPherson.....	Big Pond Centre..	Banner..........
Rev. J. W. McIsaac...	East Bay.........	Banner..........
Dan McLellan........	Big Pond Centre..	Old Island Black.
Stephen D. Gillis.....	East Bay.........	
Murdock McLellan....	Big Pond Centre..	
A. D. Morrison......	Big Pond.........	Bumper King....
Rod McLeod.........	Groves' Point.....	Island Black.....

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total
4.5	8.5	5.	23.	9.	16.	15.	4.5	85.5
4.75	9.	5.	25.	8.5	13.	15.	4.5	84.75
4.5	6.	5.	22.	9.5	18.	15.	4.5	84.5
4.75	7.5	3.	22.5	9.	17.	16.	4.75	84.5
4.	8.5	5.	24.	10.	19.	15.	5.	90.5
4.5	7.	4.5	25.	10.	18.	16.	4.5	89.5
4.75	8.5	4.25	20.	9.75	19.5	17.	4.75	88.5
4.5	7.5	4.25	24.	9.75	20.	14.	4.25	88.5
4.5	8.5	4.	24.	7.	20.	16.	4.5	88.5
5.	6.	3.	25.	10.	18.	15.	4.5	86.5
3.5	7.5	4.5	24.	9.5	18.	15.	4.5	86.
3.5	6.5	5.	25.	9.5	18.	14.	4.25	85.75
4.5	7.5	4.5	22.	9.5	17.	16.	4.75	85.75
4.5	9.5	1.	23.	10.	16.	17.	4.5	85.5
4.	6.	5.	25.	10.	19.	12.	4.5	85.5
3.25	6.	4.	22.5	10.	20.	13.	4.5	83.25
4.25	8.	5.	23.	10.	10.	15.	5.	80.25
4.25	6.	4.75	20.	10.	15.	12.	5.	77.

COLCHESTER COUNTY.

Name of Competitor	Address	Variety.
Geo. Burrows.........	R R.No. 3, Truro..	Early Blossom....
Blair Cutten.........	Lower Truro......	Banner..........
J. R Semple.........	R.R.No. 1, Tatamagouche	Banner..........
J. W. Murray........	Balmoral Mills....	Banner..........
Arnold Johnson.......	Lower Truro	American Banner
J. L. Cunningham.....	Bayhead.........	Banner..........
Wilmot L. Fulton.....	Lower Stewiacke..	Banner..........
R. D. McKay........	Balmoral Mills....	Banner..........
A. B. Cunningham....	Tatamagouche....	Banner..........
Alex. Ross...........	East Earltown....	Abundance......

GUYSBORO COUNTY

Arthur J. Sinclair.....	Goshen...........	20th Century.....
John A. Sinclair......	Goshen...........	Banner..........
Alex. T. McBain......	New Town.......	Banner..........
Harry Sinclair........	Goshen...........	Banner ....
A. F. McNaughton....	Goshen...........	Banner..........
Ronald McIsaac......	Giant's Lake......	Banner..........
John F. Forbes.......	Goshen...........	Tartar King.....
T. C. McLean........	Denver...........	Banner..........

General appearance considerin:g— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total
4.5	9.5	2.5	24.	9.5	18.75	18.	4.75	91.5
4.5	9.5	3.25	23.5	9.5	18.	18.	4.75	91.
4.5	8.	4.75	22.75	9.	19.	18.	4.75	90.75
4.	8.	4.	22.	9.75	20.	18.	4.75	90.5
4.5	8.75	3.	23.5	9.5	18.	18.	4.75	90.
4.25	8.25	4.5	21.75	8.75	19.5	18.	4.75	89.75
4.5	9.5	3.75	20.5	9.25	19.5	18.	4.5	89.5
4.	8.	4.75	20.5	9.5	20.	17.5	4.75	89.
4.5	8.5	4.5	20.	9.5	19.25	17.5	4.75	88.5
3.75	7.25	4.5	23.	9.25	18.5	16.5	4.75	87.5
4.75	9.	5.	24.5	9.5	18.	16.	4.5	91.25
5.	8.5	4.	23.	10.	19.5	16.	5.	91.
4.75	10.	2.	24.	9.	20.	17.	4.	90.75
4.25	9.	4.5	24.	9.75	18.	16.5	4.5	90.5
4.5	9.	4.5	24.	8.	19.5	16.	4.5	90.
4.	8.5	4.5	23.5	9.5	19.	17.	3.5	89.5
4.5	9.	5.	24.	10.	15.	17.	4.75	89.25
4.75	9.	3.5	23.	9.	19.	16.	4.5	88.75

Name of Competitor	Address	Variety.
Mrs. Catherine McLean	Porter's River	Banner
Dan McNeil	S. River Lake	Banner
Leonard A. Sinclair	Goshen	Ligowe
W. Sutherland	Denver	Banner
Edward F. Sinclair	Goshen	Banner
John F. Wall	Goshen	Tartar King
Stanley Sinclair	Goshen	Banner

HALIFAX COUNTY.

John Ogilvie	Elderbank	Banner
Robt. Kaulbach	M. Musquodoboit	Banner
R. H. Reld	Brookvale	Banner
Arnold Gladwin	M. Musquodoboit	Banner
Ernest Redmond	Deans	Banner
G. Burris & Son	U. Musquodoboit	Banner
Robt. S. McCurdy	M. Musquodoboit	Banner

INVERNESS COUNTY.

A. J. Campbell	Beatonville	Banner
Duncan Campbell	Margaree Forks	Banner
James Beaton	Beatonville	Kempt or Aber.
A. Scott McDonnell	Port Hood	Banner

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total
4.	9.	3.	23.	9.	20.	16.	4.5	88.5
4.5	9.5	4.25	23.	9.	17.	17.	4.	88.25
4.	8.	5.	23.	9.	17.	17.	5.	88.
5.	10.	2.5	21.	8.	19.5	17.	4.	87.
4.	8.5	5.	23.	9.5	17.	15.	4.5	86.5
4.5	10.	4.	24.	9.5	10.	18.	4.5	84.5
3.	7.	3.	24.5	9.5	19.	14.	4.	84.
4.5	9.	3.	24.75	10.	20.	16.5	4.	91.75
4.	9.	2.5	24.	10.	20.	17.	4.	90.5
4.	9.	4.	23.5	9.	19.	17.	4.5	90.
4.25	9.	2.5	24.	9.	20.	16.	4.75	89.5
4.75	9.	3.5	24.5	8.5	18.	17.	4.	89.25
4.5	8.5	3.5	24.	9.5	20.	15.	4.	89.
4.	8.	3.	24.	9.25	20.	16.	4.5	88.25
4.75	10.	4.75	24.5	9.	20.	19.	4.5	96.5
4.5	9.25	4.75	24.75	9.75	19.75	18.25	4.75	95.75
4.75	9.	5.	24.75	9.5	20.	18.	4.5	95.
4.	9.	4.75	24.5	10.	20.	17.75	4.5	94.5

Name of Competitor	Address	Variety.
R. Dan. McDonald. . .	Broad Cove Chap	Old Island Rock. .
James McDonald.	S. W. Mabou.	
Eddy Smith.	Blackstone.	Banner. . . . .
A. T. Beaton.	Brook Village.	Banner. . . . .
James M. Murphy. . . .	N. E. Margaree. . .	Banner. . . . .
H. A. McPherson.	Mabou.	White Wave. . . . .
A. R. McDonald.	Broad Cove Chap.	Old Island Black.
John E. Beaton	Inverness Corner. .	Old Island Black.
Constant AuCoin.	Belle Cote.	Anthony. . . . .
P. N. Tompkins.	East Margaree. . . .	
John Beaton.	Blackstone.	Banner. . . . . . .
Louis L. Smith.	Blackstone.	Early Fielder. . . .
James B. McLeod.	West Bay.	Banner. . . . .
Wm. McLean.	North Ainslie.	Banner. . . . .
Patrick Gillis.	East Margaree. . . .	Banner. . . . .
J. J. McLellan.	Glenville.	Old Island Black.
Alex. Campbell.	Beatonville.	Banner. . . . .
John A. Campbell.	Glenora Falls.	
John A. Chiasson.	Margaree Forks. . .	Banner. . . . .

General appearance considering:— (1) stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total
4.75	9.5	5.	24.75	8.75	20.	18.	4.25	94.
4.	8.25	4.5	24.5	10.	20.	17.	4.75	93.
4.75	9.	4.75	24.	9.	19.5	17.	5.	93.
4.5	9.	4.5	22.	10.	20.	18.	4.	92.75
4.25	9.	5.	24.75	9.	18.	17.5	4.75	92.25
4.5	8.5	4.5	24.25	10.	19.	17.	4.5	92.25
4.	8.	4.75	24.5	9.5	20.	16.75	4.5	92.
4.5	9.	3.5	25.	9.5	19.	17.75	3.75	92.
4.5	8.	4.75	25.	10.	19.	16.5	4.	91.75
4.5	9.5	4.75	23.	9.75	17.5	18.	4.5	91.5
4.25	8.75	4.75	25.	9.75	17.	17.5	4.5	91.5
4.75	9.5	4.5	20.	10.	20.	18.	4.5	91.25
3.5	9.	5.	25.	9.5	18.5	16.	4.75	91.25
4.5	8.75	5.	25.	9.5	17.	16.5	4.5	90.75
3.5	8.5	5.	24.	9.75	19.	16.	5.	90.75
4.5	9.25	5.	23.	9.75	17.	17.5	4.75	90.75
4.	8.	4.	22.5	10.	20.	17.	4.5	90.
3.5	9.	4.75	23.5	10.	19.5	16.5	5.	89.75
4	8.	4	24.	10.	19.	16.	4.	89.

Name of Competitor	Address	Variety
Arthur Munroe.......	Margaree Harbor..	Banner..........
Horace L. Smith......	Glendyer.........	Banner..........
Angus A. McDonald...	S. W. Mabou.....	
Angus J. Boyd........	Glendale.........	Island Black.....
Mrs. D. Campbell....	Margaree Forks...	Banner..........
Peter McDaniel.......	Margaree Forks...	Gold Finder.....
Michael Tompkins....	Margaree Forks...	Banner..........
Alex. Rankin.........	Judique..........	Black Tar........
B. F. Smith..........	Blackstone........	

LUNENBURG COUNTY.

Name of Competitor	Address	Variety
Wallace Rhodenizer...	Bridgewater......	White Banner....
A. W. Hebb..........	Bridgewater......	White Banner....
O. G. Dauphinee......	Bridgewater......	White Banner....
Albert Veinotte.......	West Northfield...	White Banner....
Joseph Kaulbach.....	Bridgewater......	White Banner....
D. A. Newcombe.....	Newcombville.....	Tartar King.....
Mark Rhodenizer.....	West Northfield..	White Banner....
Artemas Joudrey......	Bridgewater......	Tartar King.....
Jas. Mader...........	Bridgewater......	Tartar King.....

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total
4.5	9.5	3.	24.	9.25	18.	17.75	3.	89.
4.	8.	4.	23.5	9.75	18.	17.	4.75	89.
4.	9.	3.	23.	10.	18.	17.	4.5	88.5
3.75	8.5	3.	25.	9.	19.75	15.5	4.	88.
4.25	8.	2.	24.5	9.	19.	16.	4.	86.75
3.5	8.	5.	23.	9.75	16.75	16.	4.75	85.75
4.5	8.5	2.	22.	10.	19.5	15.	4.	85.5
4.	8.5	4.	21.	10.	18.	17.5	5.	84.
4.	5.	5.	23.	10.	20.	10.	4.5	81.5
4.5	9.	5.	24.	9.	20.	19.	4.5	95.
5.	9.	4.75	24.	10.	19.5	18.	4.5	94.75
5.	9.5	4.75	23.	9.5	20.	18.	4.5	94.25
5.	9.5	4.75	24.	9.5	17.5	19.	4.75	94.
4.75	9.5	4.75	24.	9.5	18.	18.	4.5	93.
4.75	9.5	5.	22.5	9.	19.	18.	7.75	92.5
4.75	9.5	4.75	21.	9.5	20.	17.5	4.5	91.5
4.5	9.	5.	23.	9.5	17.5	17.5	5.	91.
4.75	9.	4.	23.	9.5	17.5	17.	4.5	90.25

Name of Competitor	Address	Variety
Alzonas Silver & Son..	Bridgewater......	Banner..........
Asaph McKay........	U. Northfield.....	Brown Maine....

RICHMOND COUNTY

Name of Competitor	Address	Variety
John J. McDonald....	Soldier's Cove.....	Banner..........
Rev. R. L. McDonald.	St. Peters........	Banner..........
Wm. Kemp..........	L'Archeveque	Kemp ....
Geo. J. Matheson.....	L'Archeveque.....	Banner..........
Wm. A. Urquhart.....	West Bay........	Ligowa..........
Alex. G. McKay......	Grand River......	Banner..........
M. A. McCuspic......	Grand River......	Banner..........
John J. Johnston.....	Red Isles.........	Black Tartarian..
Alex. Matheson.......	St. Esprit........	Kemp..........
Joseph Gillis..........	Soldier's Cove.....	Island Black.....
Martin Gillis..........	Soldier's Cove.....	Island Black.....
John F. Gillis........	Soldier's Cove.....	Island Black.....
John R. Ferguson.....	Ferguson's Lake...	Banner..........
Dan A. Matheson.....	L'Archeveque.....	Banner..........
Angus A. McDonald...	Soldier's Cove.....	Banner..........
Allan H. McDonald...	Soldier's Cove.....	Island Black.....

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total
5.	9.5	5.	24.	9.	10.	18.5	4.5	85.5
4.5	8.	5.	22.5	9.5	12.	16.	5.	82.5
4.5	9.5	4.75	25.	10.	20.	18.	4.5	96.35
4.75	9.5	4.75	25.	9.	20.	18.	4.5	95.5
4.75	9.75	4.25	24.5	10.	20.	17.	4.5	94.75
4.25	10.	4.5	24.	10.	19.5	17.	5.	94.25
4.75	9.5	5.	25.	10.	18.	17.	4.75	94.
4.	8.	5.	24.5	10.	20.	16.	4.5	92.
4.	9.	4.75	24.5	10.	19.	16.	4.5	91.75
4.25	8.	5.	25.	10.	17.	16.	4.75	90.
4.5	8.5	5.	25.	10.	20.	12.	5.	90.
4.	8.5	3.5	24.5	10.	20.	15.	4.5	90.
3.5	9.	4.	25.	10.	18.	14.	4.	87.5
4.	7.	4.75	24.	10.	18.	15.	4.5	87.25
4.25	8.5	3.5	24.5	10.	16.	16.	4.5	87.25
4.	7.5	5.	24.5	10.	19.	12.	4.5	86.5
4.	9.25	4.25	22.	9.75	16.	16.	5.	86.25
4.	7.	4.5	24.5	10.	16.	15.	4.75	85.75

Name of Competitor	Address	Variety
Michael McDonald....	Soldier's Cove.....	Island Black.....
Dan. M. McAulay....	Grand River W....	Banner..........
Murdock D. Finlayson	Grand River W....	Banner..........
Rod. A. McLeod......	Lewis Cove Road..	Banner..........
Archie C. McBeth....	Grand River......	Banner..........
A. D. McLeod........	L'Ardoise Highl'd's	
John McAulay........	Grand River W ...	Banner..........
Angus A. Morrison....	Loch Lomond W...	White Wave.....
John L. McAulay.....	Grand River......	Banner..........

VICTORIA COUNTY.

Name of Competitor	Address	Variety
Farquhar Buchanan...	Baddeck Forks....	Banner..........
H. G. Matheson	Hunter's Mountain	Banner..........
A. J. McRitchie......	Baddeck Bay.....	
P. K. McIvor........	Baddeck Bay.....	Banner..........
Farland McFarlane...	Baddeck.........	
Everett Rice.........	Baddeck Forks....	Banner..........
F. A. McRae.........	Baddeck Bridge...	
A. D. McRae.........	Baddeck.........	Banner..........
C. R. McDonald......	Nyanza..........	Island Black.....

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total
3.5	7.	4.5	23.	10.	19.	14.	4.5	85.5
4.	6.	6.	20.	10.	20.	14.	4.5	83.5
3.5	6.	4.	24.	9.	16.	16.	4.5	83.
4.5	6.	4.	23.	9.75	19.5	10.	4.5	82.25
4.5	6.	4.5	24.	9.5	19.	10.	4.5	82.
4.25	7.	4.75	22.	10.	15.	14.	4.5	81.5
4.	6.	5.	21.	9.	20.	11.	4.5	80.5
4.	7.	4.5	24.	10.	12.	14.	4.5	80.
3.5	5.	4.	22.	9.5	19.	10.	4.5	77.5
4.75	9.75	4.5	25.	9.	20.	18.	4.5	95.5
4.5	9.5	4.75	23.	10.	19.	17.75	4.75	93.25
4.5	9.0	5.	24.75	9.	18.	17.75	4.75	92.75
4.	8.75	4.75	25.	9.5	20.	17.	4.25	92.25
3.75	8.75	5.	23.	10.	18.	17.5	4.25	90.25
4.	8.	4.75	24.	9.25	18.	16.5	4.75	89.25
5.	8.5	2.	25.	9.	20.	15.	4.	88.5
5.	9.5	2.	24.	10.	18.	15.	4.	87.5
5.	8.5	4.25	24.	9.75	16.	17.5	4.25	87.25

Name of Competitor	Address	Variety
J. M. Campbell.......	West Middle River.	Tartar King......
Albert Crowdis.......	Baddeck Bridge...	Banner..........
J. A. McDonald.......	U. Middle River...	Banner..........
Neil McKinnon.......	Kempt Head......	Black...........
Duncan McLennan....	U. Middle River...	
Forbes McDonald.....	Middle River......	Banner..........
YARMOUTH COUNTY.		
John Corning.........	Chegoggin........	White Banner....
Adolphus Corning.....	Chegoggin........	White Banner....
Clifford Cann........	Chegoggin........	White Banner....
S. A. Cook...........	C. Chebogue.....	White Banner...
Murray Crosby.......	Dayton..........	White Banner...

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total
4.	8.75	5.	23.5	9.5	16.	16.	4.75	87.25
4.5	8.5	2.	22.	9.	20.	15.	4.	85.
3.	7.	5.	23.	9.	18.	15.	5.	85.
5.	9.25	4.75	24.5	9.5	10.	17.5	4.	84.50
4.	8.5	4.75	23.25	10.	13.	16.	4.5	84.
2.5	7.	3.	25.75	9.	18.	14.	4.5	82.75
4.75	9.5	4.5	22.	10.	19.	18.5	4.75	93.
4.5	9.5	5.	22.	10.	19.	18.	4.5	92.5
4.5	9.5	4.75	22.	10.	19.	18.	4.5	92.25
4.5	9.	5.	23.5	10.	18.	17.5	7.5	92.
4.75	9.5	4.25	22.	10.	17.5	17.5	4.5	90.

POTATOES.

District No. 2, Annapolis, Kings, Lunenburg and Hants Counties.

LUNENBURG COUNTY

Name of Competitor	Address	Variety.
Albert Venoit..........	West Northfield...	Carmen..........
James Mader..........	Bridgewater......	Mills Pride ......
Owen Dauphinee....	Bridgewater......	Mills Pride
Scott Hebb	Bridgewater......	
Annand Hebb.........	Bridgewater......	Mills Pride ......
A W. Hebb..........	Bridgewater......	Carmen..........
Wallace Rhodenizer...	Bridgewater......	Green Mountain.
Levi Hebb...........	Bridgewater......	Mills Prize.......
Alzonas Silver & Son...	Bridgewater......	
Asaph McKay.........	Up. Northfield....	Rural Blush......
Hiram Corkum.......	Baker Settlement..	Mills Prize......

District No. 3, Pictou, Cumberland and Colchester Counties.

Name of Competitor	Address	Variety.
Calvin Langille.......	Marshville........	McIntyre........
John R. Harrison......	Lower Maccan....	Carmen.........
Wm. McKenzie.......	Green Hill........	McIntyre........
J. W. Maxwell........	Durham..........	Carmen.........
R. D. Ross...........	Bayview.........	
Fowler Bros..........	Amherst Point....	Carmen.........

General appearance considering:— (1) Method of planting, stand of crop.	(2) Vigor of growth, acreage, etc.	Freedom from blight, scabs and insects.	Method of thoroughness of cultivation.	Purity of variety.	Apparent yield considering:— (1) Number and weight of marketable potatoes per hill.	(2) Quality, color, shape and smoothness.	(3) State and uniformity of maturity, and freedom from sunburn.	Total.
7	8	20	20	10	15	10	10	100
6.75	7.5	18.	19.	10.	13.5	9.	9.	92.25
6.	7.	17.5	18.	10.	13	9.	8.5	89.
6.	7.	17.	18.	10.	12.5	9.	8.	87.5
6.	7.	17.	17.5	10.	13.	9.	8.	87.5
6.	6.75	17.	17.	10.	13.	9.	8.	86.75
6.	7.	16.75	17.	10.	13.	9.	7.5	86.25
6.	6.5	16.	16.5	10.	13.	8.5	7.	83.5
6.5	6.5	16.5	16.	9.	12.	8	8.	82.5
6.	6.	16.	16.5	10.	12.5	8.	7.	82.
5.	7.	17.	16.	10.	12.	7.5	7.	81.5
5.75	6.	16.	16.25	7.	13.	8.	8.5	80.5
6.5	7.5	18.5	18.	10.	10.5	9.	9.	89.
6.5	7.	18.	18.	10.	9.	9.	9.	86.5
6.	7.	17.5	16.5	10.	11.	9.	9.	86.
5.5	6.5	16.	16.	10.	10.	9.	9.	83.
5.	6.	15.	16.	9.5	10.5	8.	9.	79.
5.	7.	18.	16.	10.	7.	8.	7.	78.

Name of Competitor	Address	Variety
J. W. Logan..........	R.R. No. 1 Pictou..	McIntyre........
Blair Cutten.........	Truro............	
Halifax, Guysboro and Antigonish Counties.		
James Thompson......	Cloverville........	Carmen.........
John Inglis...........	North Lochaber...	McIntyre........
Geo. Burris & Son.....	U. Musquodoboit..	Dakota Red.....
Ernest Redmond......	Dean............	Seedlings........
Alex. C. Chisholm.....	North Grant......	Dakota Red.....
Dougald McGregor....	U. South River....	Carmen.........
Alex. H. McPherson...	U. South River....	
Adams Archibald.....	M. Musquodoboit.	Carmen No. 1....
Alex. McDonald......	Doctor's Brook....	Dreer's Standard.
Cape Breton, Inverness, Richmond and Victoria Counties.		
James A. Beaton......	Beatonville.......	McIntyre........
John J. Johnson.......	Red Isles.........	McIntyre........
H. A. McPherson......	Mabou...........	McIntyre........
J. J. McLellan........	Glenville.........	
John A. Campbell.....	Glenora Falls.....	McIntyre........
Eddy Smith..........	Blackstone.......	McIntyre........

General appearance considering:—(1) Method of planting, stand of crop.	(2) Vigor of growth, acreage, etc.	Freedom from blight, scabs and insects.	Method of thoroughness of cultivation.	Purity of variety.	Apparent yield considering:—(1) Number and weight of marketable potatoes per hill.	(2) Quality, color, shape and smoothness.	(3) State and uniformity of maturity, and freedom from sunburn.	Total.
6.5	7.5	18.	18.5		12.	8.	7.	77.5
6.	7.	15.	17.		9.	8.	8.	70.
6.25	8.	17.	18.	10.	12.5	9.5	9.75	91.
6.5	7.25	17.	18.5	10.	12.	9.5	9.75	90.
6.5	7.5	17.5	18.	10.	12.	9.75	9.	90.25
6.5	7.5	16.75	18.	9.75	12.	9.75	9.75	90.
6.25	7.	17.	18.	10.	10.75	7.25	9.75	86.
5.5	7.	15.	17.5	9.75	10.	8.5	9.75	83.
5.5	7.	15.5	17.	9.5	10.	8.5	9.75	82.75
5.25	6.75	15.	15.	10.	7.	6.	9.5	74.5
5.75	5.75	15.	17.	10.	9.5	7.	9.75	74.
7.	8.	18.	17.	10.	11.	10.	10.	91.
6.5	8.	18.	19.	9.75	10.	9.5	9.25	90.
6.	7.5	16.	20.	9.5	11.	10.	9.5	89.5
6.5	7.	17.	18.	10.	11.	10.	10.	89.5
6.	7.75	18.	18.5	10.	9.5	10.	9.5	89.25
6.5	6.5	17.	20.	8.	9.	10.	9.5	86.5

Name of Competitor	Address	Variety
A. T. Beaton.	Brook Village....	McIntyre........
Archibald McCuish....	Lochside.........	
John Beaton..........	Blackstone.......	McIntyre........
C. AuCoin...........	Belle Cote........	McIntyre........
John McMullin.......	George's River....	Burbank........
Dougald Campbell....	Margaree Forks...	Irish Cobbler.....
Alex. Rankin.........	Judique..........	McIntyre........
Peter McDaniel.......	Margaree Forks...	Medium Early...
Alex. L. Gillis.........	Margaree Forks...	McIntyre........
Patrick N. Tompkins..	East Margaree....	Black...........
A. T. Campbell.......	Beatonville.......	McIntyre........
J. Archie McDonell....	Judique Intervale..	
D. R. Nicholson.......	Coxheath.........	Green Mountain..
J. W. Campbell.......	Middle West River.	Carmen No. 1....
F. A. McRae.........	Baddeck Bridge...	Thorburn........
Arthur Smith.........	Blackstone........	McIntyre........
Allan Rankin.........	N. E. Mabou.....	McIntyre........

General appearance considering:— (1) Method of planting, stand of crop.	(2) Vigor of growth, acreage, etc.	Freedom from blight, scabs and insects.	Method of thoroughness of cultivation.	Purity of variety.	Apparent yield considering:— (1) Number and weight of marketable potatoes per hill.	(2) Quality, color, shape and smoothness.	(3) State and uniformity of maturity, and freedom from sunburn.	Total.
6.75	7.	16.	16.	10.	10.5	10.	10.	86.35
5.5	7 5	16.	20.	10.	10.	8.	9.	86.
7.	7.75	17.	19.	9.	9.	8.	9.	85.75
5.5	6.75	17.	16.	10.	8.	9.5	10.	83.75
6.75	7.	15.	16.	10.	10.	8.5	10.	83.25
6.	7.	17.	15.	8.	10.	10.	10.	83.
7.	6.	15.	15.	10.	9.	10.	10.	82.
6.	7.5	16.	16.	8.	9.	9.5	10.	82.
6.5	7.	16.5	15.	10.	8.	9.5	9.	81.5
6.25	7.5	10.	15.	10.	13.	10.	9.75	81.5
4.	8.	19.5	19.	10.	8.	8.	5.	81.5
7.	7.	10.	19.	9.	9.	10.	10.	81.
7.	7.5	12.	19.	10.	8.	8.5	8.	80.
7.	8.	15.	13.	5.	10.	10.	10.	78.
6.	7.	15.	14.	7.	8.	9.5	9.	76.
6.	8.	16.	15.	4.	7.	10.	10.	76.
4.	6.	17.	10.	5.	9.	10.	10.	71.

TURNIP COMPETITION,

Antigonish County.

Ebenezer Henderson, Copper Lake	81.95	909.3	1st	$75.00
Frank Dunn, L. South River	75.75	725.3	2nd	50.00
Harold C. Irish, Afton	74.05	642.7	3rd	30.00
Albert Hattie, Copper Lake	73.8	765.3	4th	20.00
Nelson Cameron, Clan Alpine	74.6	781.3		
(Disqualified on account of Short Acre).				
Willie Brown, West Lochaber	72.75	600		
J. P. McFarlane, Antigonish	72.75	752		
Angus A. McDonald, Fraser's Mills	72.72	736		
Colin D. Chisholm, Lr. South River	72.55	666.7		
Roy Inglis, North Lochaber	72.4	720		
Willie Ross, Antigonish	72.37	618.7		
Adam Kirk, Clydesdale	72.06	653.3		
John Clement Chisholm, St. Andrews	71.5	626.7		
Wilfred Broadfoot, Antigonish	70.59	554.7		
Dougald Cameron Gillis, Georgeville	64.99	312		
Hiram F. Grant, S. River Lake	60			

*Estimated Yield.

Colchester County.

John A. Semple, Brule	86.5	975	1st	$75.00
Frank S. Crowe, Old Barns	85.25	1087.5	2nd	50.00
Roy Vance, Masstown	84.	950	3rd	30.00
Wallace Bowers, Great Village	83.75	950	4th	20.00
Graham W. Yuill, R. R. No. 1 Truro	83	950		
Douglas Yuill, Old Barns	81.5	1050		
Frank Jennings, Masstown	81.25	887.5		
Chas. E. Layton, Great Village	80.75	950		
Elmer Johnson, Cross Roads	80.5	850		
Wendell Peppard, Great Village	79	912.5		
Willard A. Fulton, Bass River	*65			
Arnold Johnson, Lower Truro	*65			

*Estimated Yield.

Guysboro County.

Vincent McLean, New Town....	78.48	1024	1st	$75.00
M. Ralph Forbes, Goshen......	74.49	712	2nd	50.00
R. E. Archibald, New Town....	72.46	610.7	3rd	30.00
Duncan McIsaac, Giant's Lake..	70.58	504	4th	20.00
J. Roy Sinclair, Goshen........	70.32	541.3		
Vincent M. McKean, Aspen....	70.02	538.7		
Donald H. Sinclair, South River Lake..................	68.95	522.7		
James F. McIsaac, Giant's Lake	Not Scored			
Angus Clement McIsaac “	Failure.			

Halifax County.

Laurence McKay Ogilvie, Elderbank..................	88	962.5	1st	$75.00
Stewart Archibald, Elmvale....	78.25	800	2nd	50.00
Carl Ogilvie, Elderbank........	77.5	662.5	3rd	30.00
Isaac Newton Joudrey, Middle Musquodoboit..........	76.25	650	4th	20.00
Josiah H. Jordan, Brookvale....	75.25	700.		
C. Elwin Day “	74.75	675		
Arthur F. Fox, Mid. Musquodo..	71.25	525		

Inverness County.

Donald J. Campbell, Glenora Falls..................	80	794.7	1st	75.00
Wilson Cassidy., Blackstone....	79.55	818.7	2nd	50.00
Mike P. Murphy, Murphy......	79.1	853.3	3rd	30.00
Duncan McKillop, S.W. Mabou.	78.6	730.4	4th	20.00
Napoleon AuCoin, Belle Cote...	76.75	853.3		
John Dan Beaton, Blackstone...	75.6	781.3		
Martin Murphy, N. E. Margaree	74	714.7		
Daniel Tompkins “ “	73.65	693.3		
Peter J. Tompkins, Emerald, Margaree..............	72.2	536		
James R. Gillis, Margaree Forks	67.2	437.3		
John Francis McDonnell, Judique Intervale..........	66			
Harold McDonald, Glendyer ...	Failure.			
Richard Anderson, Mabou......	“			
Geo. Hiltz, Glendyer...........	Not Eligible			

Pictou County.

J. James Ross, Bayview........	84.5	875	1st	$75.00
D. Clarence McKay, Scotsburn..	79.75	812.5	2nd	50.00
Geo. M. Tattrie, Marshville.....	78.5	650	3rd	30.00
James Stuart Langille, Marshville....................	76.75	712.5	4th	20.00
Willard Craigie, Merigomish....	74	550		
Morgan J. Tamplin, Hopewell...	72.5	450		

REPORT OF DEMONSTRATION WORK IN CAPE BRETON.

Mr. F. L. Fuller,
Superintendent of Agricultural Societies,
Truro, N. S.

Sir:—I have the honor to submit herewith the third Annual Report of Demonstration work carried on in the Island of Cape Breton.

I commenced operations on April 23rd and the remainder of the month, as well as the month of May, was spent in getting in touch with plot owners and the farmers generally. Several meetings were held in various places in the interests of root growing.

During the months of June and July, I did considerable instruction work as well as addressing several meetings in company with Prof. Cumming, Prof. Trueman and W. A. MacKay. During this period I spent considerable time among the farmers in the interest of the Baddeck Creamery, not only in these districts already in touch with it but also in bringing outlying sections in touch. There is room for a vast amount of work along this line.

The remainder of the season was spent in judging field crop competitions on the Island, judging at various exhibitions and in making a few drainage surveys.

The regular plot work as well as the greater part of the outside instruction work was left in the hands of my assistants, Mr. H. B. Langille and Mr. J. M. F. McKenzie. During the season these gentlemen worked some twenty root plots having a total area of about twenty acres. A report of results obtained will be found in the report of Mr. Langille. In addition to these plots, two small plots were worked, one in Breton Cove and one at Ingonish. The Breton Cove plot was seeded entirely to turnips, while the one at Ingonish, while largely seeded to turnips, had a part seeded to such vegetables as carrots, parsnips, beans, etc. This work was in charge of Mr. Thomas Munn who did the work thoroughly.

An effort was made this year to advertise as far as possible by means of posters the date on which the instruction was to be given. In spite of this very few people took advantage of it.

All plots were handled in much the same manner as last year. Owing to the high price and scarcity of muriate of potash, none of this material was used on the plots this year, nitrate of soda, acid phosphate and basic slag were the commercial fertilizers used in conjunction with barnyard manure, Wherever possible acid phosphate was used on one half of each plot and basic slag on the other with a view of getting some data upon their relative values when used under the root crop. It is extremely hard to get results which are reliable for several reasons:

In some cases the land available for the purpose has been worked in very small areas previous to this time;

Again the soil varies greatly in composition even in small areas.

And in many cases plot owners do not carry out instructions as well as we would wish.

On the plot as Salmon River, Richmond County, a complete experiment in the use of commercial fertilizers was attempted. I am sorry to report that from an experimental standpoint this was a complete failure. This was chiefly due to weather conditions The land was wet and owing to the abnormal amount of rainfall during the months of June and July, it was never in a fit condition to cultivate properly. This, added to the fact that it did not receive the care and attention it should have accounts for the failure.

Invaluable as this data would be, I feel that it is useless to carry on anything in the line of fertilizer experiments unless of a very simple nature.

In addition to the regular plot work, thirty-one farmers applied for assistance in seeding plots of roots on their own farms All these men were visited and while in a few cases they had already done the work, yet to the majority of these men practical instruction was given in seeding and thinning.

Having a quantity of turnip seed over and above what was necessary for seeding the regular plots, it was used in seeding the outside plots and distributed in small quantities to those who wished to make a start in growing this crop.

Those plots which were under roots in the season of 1913 were under hay this year and a heavy crop was cut on all plots. The plots which were under roots last season were sown to grain this season and seeded out.

One or two which were seeded to wheat gave a light crop but on the majority of the plots the grain, both wheat and oats, although thin, was well headed and well filled.

The catch of grass on these plots is good and with a favorable season the yield will be heavy.

The outlook for the root crop is not very promising, the excescive rainfall during the seeding season made it almost impossible to get the land in a suitable condition and those plots which were seeded early could not be cultivated. During the month of August the growth was rapid and with the beginning of September all plots had made a vigorous growth. In the early part of September it was very hot and dry and the plants received a check from which they have never recovered although at the date of writing, the roots are making a good growth.

The hay crop on the Island this year was the heaviest on record but owing to weather conditions at the time of cutting very little hay of good quality was stored.

Grain was generally well headed and well fitted although somewhat thin. There is, however, a considerable amount of grain which will not ripen.

Potatoes are fully 40% short of last year in yield. Blight was universal all over the Island and considerable rot is to be found.

In summing up the work for the season the results have on the whole been satisfactory. I would not, however, recommend the establishing of any more regular demonstration plots but would recommend carrying on the plots as established and meeting as far as possible all applications for instruction from farmers.

I desire to take this opportunity of thanking the Department for providing me with an automobile. This has been invaluable to me in the carrying on of my work and has enabled me to save considerable time and accomplish far more than I could otherwise have accomplished.

In conclusion, I would desire to thank my assistants, Mr. H. B. Langille and Mr. J. M. F. McKenzie, for their hearty co-operation and the thorough manner in which they have carried out their duties.

I also desire to thank you for your advice and help and also those members of the College Faculty who have assisted me in any way.

Respectfully submitted,

H. S. CUNNINGHAM.

Mr. H. S. Cunningham,
C. B. Counties Agricultural Representative.

Sir:—I have the honor to submit herewith a report of my work as your assistant during the past season and also a detailed report of results obtained on Demonstration Plots which were carried on in the four counties of the Island of Cape Breton.

During the early part of the season my work was confined chiefly to the regular and instruction plots in the counties of Cape Breton and Richmond.

During the greater part of August and September my time was spent in the judging of field crops in the various parts of the Province as well as assisting at exhibitions and school fairs.

Owing to the very wet season and the fact that some of the plots were located on low lying undrained soil, it was impossible to keep the land under a sufficient state of cultivation and this coupled with the fact that in some cases the plots were not thoroughly prepared the fall previous and did not receive as much attention as should have been given to them during the growing season, the results obtained are not as good as I would wish.

The amount of commercial fertilizer applied to the Demonstration plots was at the rate per acre of 200 lbs. nitrate of soda, 400 lbs. basic slag, and 400 lbs. of acid phosphate, making a total of 1000 lbs. commercial fertilizer per acre. As an experiment, in the majority of cases 100 lbs. of nitrate of soda was mixed with the 400 lbs. of basic slag and applied on one half the field. The remaining 100 lbs. nitrate of soda was mixed with the 400 lbs. of acid phosphate and applied on the remaining portion of the field. In most cases the half on which acid phosphate was used gave a slight increase in yield, but in all cases under my notice the slag was applied on the lower and consequently the wetter portion of the field. However, knowing that 95% of our soils are sour or acid and from close observation of good results obtained from the use of basic slag in different parts of the Island, which I think in a good many was due indirectly to the amount of lime contained in the slag, I am convinced that a judicious use of lime in some form is essential in order to obtain the greatest results in Agriculture. Further it has been proven by authentic experiments carried on by our leading Plant Pathologists that lime properly used is a preventative of Plasmodiophora brassical or club root of turnips.

Two of the Demonstration Plots were badly infested with club root, viz.—the plot at Rod Campbell's, Hillside (Boulardie and one at Reynold Smith's Arichat. As it is known that this fungus will not thrive in an alkaline soil, it was decided that a heavy application of lime in some from be applied to a small portion of these fields and turnips grown on the same soil next year. Accordingly, as an experiment, I was instructed to apply one half ton burnt lime to one eighth of an acre, the adjoining one eighth not to receive an application of lime, but the whole one quarter acre to receive an ordinary dressing of barnyard manure and commercial fertilizer. This application of lime was given to both plots this fall and harrowed in, so the question is now, will the lime have time to become thoroughly incorporated into the soil in order to produce the desired results for next season.

Although the yield of roots obtained is for reasons given comparatively small, nevertheless I feel that in summing up the season's work the results on the whole are very satisfactory.

Although there is a vast field of labor open for the encouragement of the growing of larger crops, yet it is gratifying to know that all over the Island a deeper interest in the growing of roots, etc. is being felt In fact the increased quantity grown on the plots is small in comparison to the increase as a general result of Demonstration and Instruction work.

For example many of the farmers in the outlying sections have told me that three years ago scarcely any turnips were grown for stock feeding, now quite a number are growing small patches and I hope that within the near future these farmers will not be contented with the growing of a fraction of an acre of turnips, but that every farmer in the Island of Cape Breton will count his area of turnips in acres rather than in fractions of an acre.

In scoring up the Boys' Competition of Inverness County, in company with Mr. F. L. Fuller. I was pleased to see the interest taken by the boys in the work and the large number of entries considering that it was the first year for a competition of its kind in the County. There is a promise of a much greater number entering the contest next year. I would also like to see a competition of this kind in the other three countries of the Island.

During the latter part of the season I attended a young people's exhibition at Lismore, Pictou County, where I assisted with the judging of exhibits as well as having the privilege of addressing some of the younger exhibitors. Just here let me say that a lot of credit is due the Rev. Father McKinnon, P. P. and others who assisted with the carrying on of this exhibition. I feel that a lot of good could be done along the line of getting the younger people of our country to take a deeper interest in that which pertains to Agriculture and this can best be accomplished by the encouragement and co-operation of the Department with the pupils and instructors. There are at the present time on the Island a number of school teachers and others who are doing good work along this line.

At the Inverness County Seed Fair, which was held at Port Hood on Nov. 24, quite a representation from the school were present. If it were possible I would like to see next year the younger people having an exhibition of their own in as many places as possible on the Island.

During the latter part of December I accompanied Mr. J. R. Sutherland, Creamery Manager, Baddeck, throughout a portion of the Island in the interests of the Baddeck Creamery, etc. Some 175 farmers were visited and two meetings addressed The interest taken in different phases of the work as presented was on the whole very encouraging.

I wish to take this opportunity to thank the people of the Island and elsewhere whom I met at their homes for their untiring hospitality and for the hearty support I received in my work. And in conclusion would desire to thank yourself and Mr. F. L. Fuller, as well as all others associated with the Department, for much valuable assistance.

Respectfully submitted,

H. B. LANGILLE.

TABLE A—YEAR 1915.

Name and Address	Size Plot	Kind of Soil	Previous Crop	Barn Manure C.L.	Na. No. 3	Acid Phos.	Basic Slag	Date of Seeding	Date of Thinning	Actual Yield	Yield per Acre	REMARKS
Rev. R. L. McDonald, P. P., St. Peter's............	20 ac	Clay Loam	Hay	10	40	80	80	June 10	July 19	117.5	587.5	
Rev. A. R. McDonald, P. P., Christmas Island......	.60 "	Sandy Loam	"	10	200	400	400	June 28	July 29	250	416	
Michael McDonald, Soldier's Cove................	.63 "	" "	"	30	200	250	400	June 8	July 15	244	380	
Rod Campbell, Hillside, Boul.	1.	" "	"	23	200	400	400	May 31	July 15	5.25	525	Part of plot badly infested with club root.
Reynolds Smith, Arichat.....	.75 "	Clay Loam	"	20	200	400	400	July 1	July 30	180	240	Plot badly infes. with club root.
Alex. Munroe, Marion Bridge	.74	" "	"	20	200	400	400	May 24	July 7	575	777	
Rev. J. A. McLennan, P. P., Glendale.............	1.25	Heavy Clay	"	30	200	400	400	June 29	July 28 Aug. 3	138	110	
Chas. Munn, Leitches Creek..	1.	Sandy Loam	"	40	200	400	400	July 6	July 30	616	616	
F. C. Cotton, St. George's Channel.............	1.	Gravelly "	"	28	200	400	400	June 1	July 27 July 28	567	567	
Duncan McLennan, Up. Mid. River................	.75	Sandy Loam	"	25	95	336		June 8	July 16 July 18	336	448	
‡Henry A. Archibald, Port Hastings.............	.50	" "	"	none	100	200	200	June 2	July 7	600	1200	
Angus McInnis, S. S. Big Baddeck.............	.50	" "	"	20.	100	200	200	June 7	July 13	225	450	

‡Fairly high lying soil. No barn yard manure applied on acct. of club root on 1914 turnip plot.

†D. D. McLellan, Glenville	.36	Sandy Loam	Hay	20	100	300	400	July 7	Ag. 5-6	70	193
Neil McKinnon, Kempt Head	1.	S. clay loam	"	55	200	400	400	June 4	July 15	1177	1177
A. Scott McDonell, Port Hood	1.	Clay Loam	"	30	200	400	400	May 22	July 3	405	405
David Thompkins, N. E. Margaree	1.	H. clay loam	"	20	200	400	400	June 9	July 10	600	600
John A. McDonald, Judique	1.	Heavy clay	"	35	200	400	400	June 17	July 23	636	636
Rev. P. Rankin, P. P., Creignish	.33⅓	gravelly loam	"	8	400§			June 24	July 22	105	315
Rev. A. McKenzie, P. P., Port Hukby	.50	Heavy clay	stubble	7	100	200	200	June 18	July 21	178	356
D. A. McDonald Whycocomagh	.50	Loam	stubble	9	100	200	200	May 31	July 9	300	600
John H. McDonald, Briton's Cove	.16⅔	gravelly loam	roots	12				June 1	June 22	66	396
*Rev. R. Rankin, P. P., S. B. Ingonish	.25	" "	pasture	15				May 26	June 22	68	272

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*A small vegetable garden was seeded inclusive of the ¼ acre which gave a fair yield

†Plot originally ¾ acre but owing to continuous rains, only a portion was in condition **to** seed.

§Pounds Commercial Fertilizer.

REPORT ON EXHIBITIONS.

Prof. M. Cumming,
Secretary for Agriculture,
Truro, Nova Scotia.

Sir:—I have the honor to submit my seventh annual report of County and District Exhibition.

The season of 1915 was the most successful in the history of the Province as far as Local Exhibitions were concerned. There were twelve exhibitions held during the year. This is one less than last year which is explained by the fact that the Three Counties Fruit Show was cut out this year and it was the off year for the Halifax County Show which is held every second year.

Richmond held its first County Fair at St. Peters on Sept. 14th and 15th, and considering that it was their first effort, and that they encountered bad weather it was a very successful show.

In most instances the grounds and buildings had been improved and repaired, the exhibits were of a higher standard and much more effectually displayed. The gate receipts considerably exceeded the previous year and the amount of prize money was an average of 14% larger than that of the year before. In one instance the increase over 1914 amounted to 73%.

As heretofore all exhibition associations applied to us for expert judges and I was fortunate in securing the services of the following persons: For horses, Wm. Murray, J. R. Starr and Dr. Haywood Fraser; for cattle, Prof. J. M. Trueman, S. A. Logan and Prescott Blanchard; Sheep and Swine, S. A. Logan, H. S. Cunningham; Grains and Vegetables, H. S. Cunningham, H. B. Langille, S. J. Moore and Jas. Dickson; Poultry, J. P. Landry, W. H. Henry and Owen Dauphinee; Fruit, George H. Vroom, Prof. P. J. Shaw and J. R. Starr; Domestic Science and Fancy Work, Miss Jennie A. Fraser and Miss Annie Redmond.

In the past the weakest feature of the County Exhibitions was that, for want of competition, animals that were in no way fitted for exhibitions were successful in carrying off prizes. I am pleased to state that this opportunity is fast disappearing and that none but first class and well fitted animals need apply. To further promote the necessity of having high class exhibits, I would suggest that when increasing prize money it be used in extending the prizes rather than by adding classes.

A list of exhibitions together with statements covering main features will be found in following table.

Respectfully submitted,

F. L. FULLER.

Exhibitions 1915.

County	Town	Secretary	Gate Receipts	No. of Exhibits	Prize Money	Total Receipts	Total Expenditure
Antigonish	Antigonish	Allan McDonald	$ 436.87	1400	$ 825.05	$1450.55	$1433.73
Cape Breton	Sydney	O. N. Mann	3320.50	2319	2761.05	7081.20	6861.05
Colchester & East Hants	Shubenacadie	W. D. Bowers	628.50	2378	1561.50	2153.90	2103.70
Digby	Digby	F. W. Nichols	240.00	859	421.80	560.40	697.10
Guysboro	Guysboro	H. M. Scott	273.80	650	655.35	1355.32	1289.31
Inverness	Port Hood	J. S. McLean	576.00	653	623.15	1864.09	1754.65
Mun. of Clare	Little Brook	Arnand S. Cameau	280.00	117	330.70	614.35	543.70
Lunenburg	Bridgewater	R.H.B. Robertson	1766.76		1166.95	3505.50	2990.41
Queens	Caledonia	Josiah Smith	416.40	1025	432.70	942.29	993.15
Richmond	St. Peters	E. E. Morrison	286.00	170	320.10	631.00	555.34
Shelburne	Shelburne	Wm. K. Hood	150.91	1400	512.53	911.08	811.54
Yarmouth	Yarmouth	Wm Corning	1646.75	1924	1994.82	4720.35	3657.74

Prof. M. Cumming,
Secretary for Agriculture,
Truro, N. S.

Sir:—I have the honor to submit my sixth annual report of the County Farmers' Associations.

There are now thirteen County Associations in the Province, with a membership of 1194. One hundred and forty meetings were held with an average attendance of 48.

While the membership and total number of meetings held are somewhat smaller than last year, the average attendance is considerably larger. As explained a year ago, except in counties where the Associations have taken up some work beside the employment of speakers and the holding of meetings, these Associations have lost ground. The Associations which took up some tangible work have steadily progressed and several counties have splendid organizations which are very materially aiding agriculture in their various localities.

As stated last year, there has been considerable discussion about the amalgamation of the Agricultural Societies and County Associations with a view to making the latter Association a co-operative body, for the purpose of doing business for all the Agricultural Societies in the County. The matter received considerable attention at the Provincial Farmers' Association and as a result a number of meetings are to be held in several centres of the Province with a view to establishing Farmers' Co-operative Associations. Whether County Associations will take up this work or not is entirely optional with themselves. In any event, probably some new line of work will be devised which will renew the vigor of some of these useful organizations.

All of which is respectfully submitted.

F. L. FULLER.

COUNTY ASSOCIATIONS.

COUNTY	No. of Members	No. of Meetings	Total Attendance	Average	Total Receipts	Total Expenditures	Balance
Annapolis							
President, S. A. Patterson, Wilmot; Vice-President, V. B. Leonard, Clarence; Secy.-Treas., L. W. Elliott, Clarence....................	102	13	346	27	105.99	68.16	37.83
Antigonish							
President, A. S. MacMillan, Antigonish; Vice-President, Rev. Dr. H. MacPherson, Antigonish; Secty.-Treas., Allan Macdonald, Antigonish..................................	50	.....	.....	.....	1450.55	1433.73	16.82
Cape Breton							
President, A. K. Jackson, Jacksonville; Vice-President, R. B. Murray, Coxheath; Secty.-Treas., R. M. Jackson, Jacksonville..........	102	4	270	68	445.74	381.39	74.35

COUNTY ASSOCIATIONS (*Continued*).

COUNTY	No. of Members	No. of Meetings	Total Attendance	Average	Total Receipts	Total Expenditures	Balance
Cumberland.							
President, Samuel Freeman, Amherst; Vice-President, C. E. Davison, Halfway River; Secty.-Treas., C. H. Black, Amherst.........	151	5	134	27	62.98	36.30	26.28
Digby.							
President, W. A. Bacon, Acaciaville; Vice-President, W. W. DeLong, Acaciaville; Secty-Treas F. W. Nichols, Digby	184	19	685	36	131.73	127.08	4.65
West Hants.							
President, John A. Scott, St. Croix; Vice-President, Avard Woolaver, Brooklyn, Secty-Treas H. Percy Blanchard, Ellershouse...........	...	.....	.....	.....	78.80	14.15	64.65
Inverness.							
President, D. F. McLean, Port Hood, Vice-President, James Gillis, S. W. Mabou, Secty.-Treas. A. J. Campbell, Beatonville.........	66	13	533	41	101.86	65.58	36.28

Kings President, B. H. Lee, Berwick; Vice-President, R. H. Banks, Berwick; Secty.-Treas H. W. Woodworth	50	11	225	20	134.28	109.50	24.78
Lunenburg. President, Lemuel G. Hebb, Bridgewater; Vice-President, Artemas Dauphinee, New Cornwall Sec'y-Treas. J. L. DeLong, Barss Corner	118	13	1300	100	182.30	148.32	33.98
Pictou. President, H. S. Kennedy, Alma; Vice-President J. W. Maxwell, Durham; Secty, Chas. A. Maxwell, Lower Mt. Thom	51	6	165	28	65.32	41.45	23.87
Queens. President, H. J. Freeman, Kempt; Vice-President, Judson Christopher, North Brookfield; Secty.-Treas, M. U. Freeman, Kempt		8	160	20	126.01	64.95	61.06
Richmond President. Rev. J. E. Robitaille, West Arichat; Vice-President, Rev. R. L. McDonald, St. Peters, Secty.-Treas., A. E. Morrison, Point Tupper	50	24	888	37	......	......	......
Yarmouth President, S. A. Cook, Central Chebogue; Vice-President, John F. Palmer, Dayton; Secty.-Treas., S. P. Goudey, Yarmouth	220	24	1800	75	163.52	144.45	19.07

PART III.

SOILS AND CROPS OF NOVA SCOTIA.

INTRODUCTION.

The plan of including a series of articles on some important phase of agriculture within the same covers as the somewhat formal statement of the work of the various divisions of the Department of Agriculture and, subsequently, publishing them in a separate reprint, which was inaugurated in 1907, seems to have received the stamp of public approval. At least, the demand for these articles has been such that several of the series are now exhausted. This has been notably the case with the supplement to the 1909 report of the Secretary for Agriculture the articles in which treated of "Soils and Crops of Nova Scotia." It has, therefore, been decided to include in the 1915 report a re-edited series on this subject. Some of the articles in this present report are largely identical with the original articles, having however, been brought up to date. But new articles have been added and the whole series has been so recast as to constitute practically a new publication.

For the benefit of those who would like to include in their agricultural library these publications we submit below the titles and dates of publication of the whole series:

1907	The Sheep Industry of Nova Scotia.
1908	Dairying in Nova Scotia. Re-edited in 1912.
1909	Soils, Soil Cultivation and Crops of Nova Scotia. Re-edited in this publication.
1910	Orcharding in Nova Scotia. To be re-edited in 1916
1911	Horse Raising in Nova Scotia.
1912	Swine Raising in Nova Scotia.
1913	Gardening in Nova Scotia.
1914	The Poultry Industry of Nova Scotia.

In presenting the present compilation I wish to thank those who have contributed articles. Their names will be found in the index page. All have written with a view to contributing "their bit" to the agricultural development of Nova Scotia. That the articles may in a measure accomplish this purpose is the hope of the editor.

M. CUMMING,
Secretary for Agriculture,
Province of Nova Scotia.

GENERAL DISCUSSION OF AGRICULTURE IN NOVA SCOTIA.

By M. Cumming.

A cursory visitor to Nova Scotia must form a very inadequate idea of the agriculture of the Province. The surface of the country is greatly varied by small ranges of mountains and by hills, vales, lakes and rivers, and the agriculture is, for the most part, confined to the river valleys and to relatively small local areas such as are to be found in that part of the province where the land gradually slopes towards the Gulf of St. Lawrence. The Railways, in general, run over the rougher uncultivated parts, and the best agricultural sections are usually found some distance from the main line of travel.

At the same time, it must be admitted that the actual area cleared by farmers, though larger than appears at first sight, is relatively small. According to the Dominion Census of 1911, out of 13,483,671 areas in Nova Scotia and Cape Breton, 5,260,455 are occupied by farmers, and even of this but 1,257,449 acres are being actually cultivated. It has been estimated that 60% of the lands of Nova Scotia could be farmed. There is accordingly room for a large development of farming in the Province. In the meantime, it is of immensely greater importance that the land which is now cleared be brought into a higher state of cultivation than that the acreage of arable lands should be increased. There are too many large and poorly cultivated farms in Nova Scotia and not enough well cultivated farms.

While there are notable exceptions yet, in general, the type of farming practiced in Nova Scotia has been of the kind that depletes when it should maintain the fertility of the soil. Systematic rotations have been the exception—not the rule. Moreover where rotations have been followed, they have usually been too long, the greatest error consisting in lands being left down to hay until the sod has become so thin as to provide little humus for the succeeding crop. Still further, in some counties, in the early days, oats and other cereals were grown so frequently on the same piece of land without the intervening growth of clover and without the use of manures that fields, on which these crops were grown, have lost their erstwhile fertility. The use of artificial fertilizers has in somewise improved conditions, but where wrongly used, they have not infrequently proved unprofitable and in these cases have led to soils becoming less productive than before they were tried. But a still more fundamental fault has been the too small numbers of live stock which have been maintained on the average farm of the province, a practice which has led to a scarcity of manure and a consequent further impoverishment of the soil. The story of the census reveals the fact, for it tells of one head of horned cattle to every twelve or so acres of arable land in Nova Scotia in comparison with one to every four to six acres in those countries of the world where farming is more specialized.

Specialized—that's the real explanation. Farmers have not specialized in farming in Nova Scotia. They have lumbered and fished and mined and spent seasons away from their farms. Their homes have been on the farm but they have oftimes tried to make a living elsewhere. It is not to be wondered therefore that we are compelled to make the criticisms we have of the general farming practiced in the province. None would be more ready to subscribe to these criticisms than the farmers themselves. But a change is coming about, and our farmers are in larger numbers seeking to make their whole living from their farms. The result is better methods already adopted and bigger results being achieved. This is the real justification for the publication of these and other articles on farming—for they contain, if people will take the time to read, information that is being sought by every one of those farmers who are now specializing in the art of farming.

Nova Scotia's Agricultural Assets.

During the past four years, Mr. L. C. Harlow, Chemist at the Agricultural College, has undertaken a soil survey of the province, and, while it is far from complete, yet upwards of 200 analyses, already made, have given specific and invaluable information in regard to the soil of the province. The results of his determinations may be found in the analyses published in the Chemist's section of the report of the Secretary for Agriculture for Nova Scotia 1913, '14 and '15, and a discussion will be found in a subsequent article in this series. A study of these analyses shows a wide variation both in physical and chemical character and indicates some very poor soil as well as some rich soil. The average of all the chemical analysis as presented in the following table shows that the soil of Nova Scotia is in general neither very poor nor yet very rich but slightly better than what may be classed as a good arable soil. This is clearly indicated in the following table in which are submitted the percentages of the most important elements of plant food found in the surface soils of the province and for comparison's sake the same figures for a good arable soil as defined by Warrington, late Professor of Rural Economy at Oxford, in his Chemistry of the Farm, and similar figures as defined by Synder (Minnesota).

Soil	Nitrogen	Phosphoric Acid	Potash	Lime
Good arable soil...........				
(Warrington standard).....	.15%	.15%	.2%	.3%
(Snyder standard).........	.2 "	.15 "	.3 "	.3 "
Average upland and intervale soils of Nova Scotia (Harlow)...............	.2 "	.15 "	.25 "	.25 "
Average marsh soils.......				
Nova Scotia (Harlow).....	.18 "	.15 "	.75 "	.75 "

No doubt, any who have not studied the chemistry of the soil will be surprised to learn that in 100 lbs. of soil there are such small quantities of the essential elements of plant food—less than 1% for the four most essential elements. Yet, when one considers that an acre of soil 6″ deep weighs about 2,000,000 lbs. and applies the foregoing figures one will find that in the first 6″ of an acre of average upland soil in Nova Scotia there are 4,000 *lbs. Nitrogen*, 3,000 *lbs. Phosphoric Acid*, 5,000 *lbs. Potash.* Moreover, plants draw a large part of their food from deeper portions of the soil. But even confining our attention to the first 6 inches and to the amount of nitrogen, phosphoric acid and potash removed by an average yield of some of the standard crops we learn that these figures, small as they are, indicate large possibilities of production.

Crop per Acre	Nitrogen	Removes Phosphoric Acid	Potash
Oats 45 bus. plus straw...	52 lbs.	19 lbs.	38 lbs.
Hay 2 tons.............	64 "	16 "	75 "
Turnips 600 bus.........	71 "	23 "	108 "

Dividing these figures into the total amount of the essential elements contained in the first six inches of the average soil of the province we find that there is sufficient plant food to produce upwards of one hundred good yields of standard crop and then we must remember the great stores of plant food contained in the lower areas of the soil as well as the amount which is returned in manures and fertilizers, the enriching influence of clovers—all of which combined with good cultivation will result in big crops as long as agriculture continues in the province.

Perhaps Nova Scotia's greatest asset so far as soil productivity is concerned in comparison, especially with the inland provinces and countries, is the abundant precipitation of rain. When one considers that the Alberta farmer, for example, has to make 15 inches of rain supply his crop demands for a whole year and compares that with an average of over 40 inches per annum which falls in Nova Scotia, one is led to appreciate what a valuable asset the Nova Scotia farmer has. True this rain does not always fall just when it is most needed by the crops but the farmer who cultivates his lands so as to conserve soil fertility need never fear a failure of crop which frequently occurs in drier countries. The climate is best suited to such crops as hay, roots (especially turnips), potatoes, oats, and to a somewhat lesser extent the other cereals, and in the fruit line, apples, plums, strawberries and similar small fruits. Such crops as corn, tobacco, etc., and such fruits as peaches, grapes, etc. which require much heat do not thrive as well, not only because of lack of the necessary heat but also because frosts in late May and again in September, though seldom very heavy, are usually sufficiently severe to check these sun-loving crops. And while noting the draw-backs it is well to complete the list by stating that the winters, though much less severe than in inland Canada, are of a broken character and are not conducive to the best growth of such winter crops as fall wheat. The same conditions are responsible for an occasional winter killing of clover, which, however, on our properly drained lands does not occur more than once in every five or six years.

Our agricultural assets then are good arable soil slightly above average, abundant precipitation of rain, ideal conditions when the land is properly cultivated for the growth of hay, roots, potatoes, and oats, as well as such fruits as apples, plums, strawberries, etc. The disadvantages are a somewhat long winter season, rather late springs and a lack of the intense heat necessary for the best growth of such crops as corn, and such fruits as peaches and grapes. That the advantages far outrank the disadvantages has been ofttimes shown by those farmers who have adopted proper methods of soil cultivation in the province.

GEOLOGICAL FORMATIONS AND THE SOILS OF NOVA SCOTIA.*

By M. Cumming.

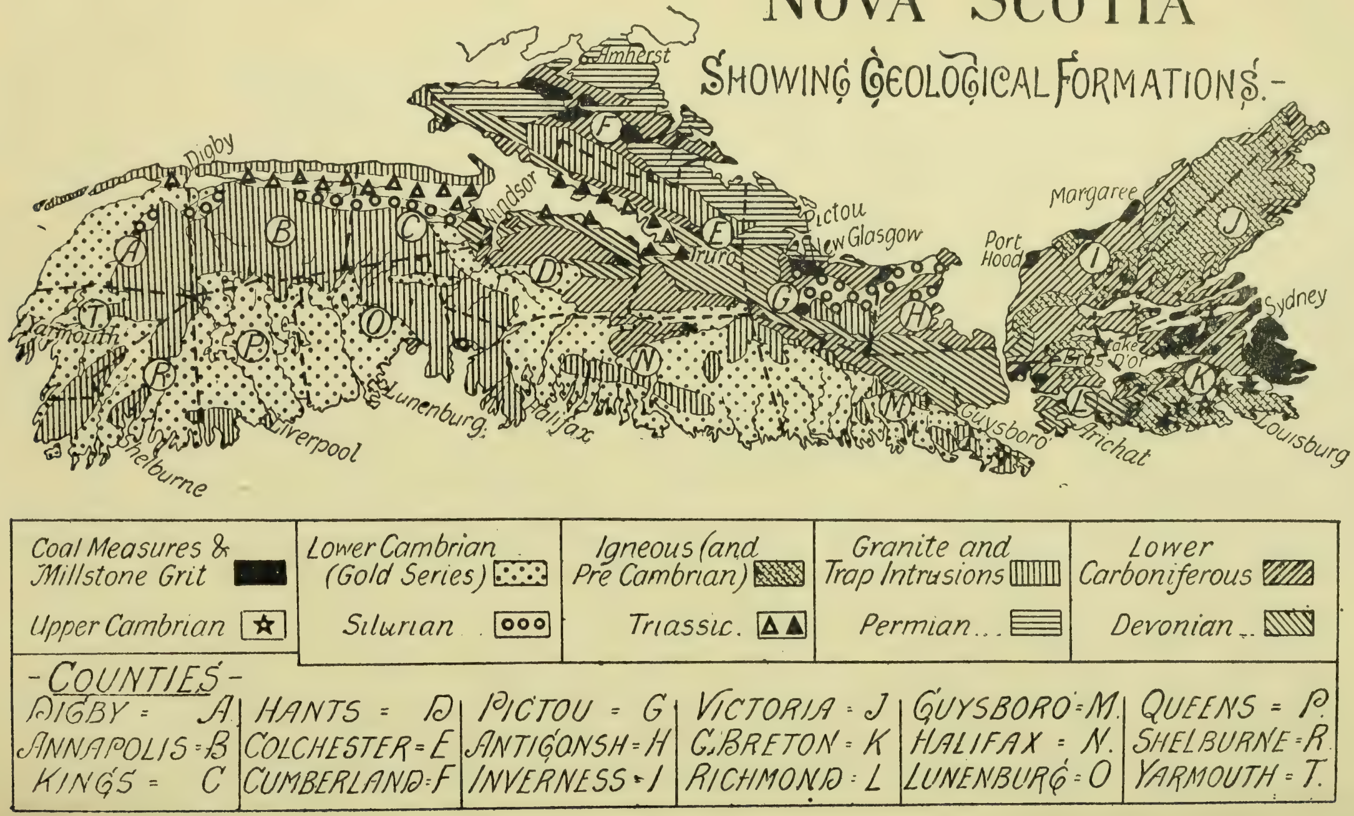
Followed by the Chemical Analyses of these Soils (L. C. Harlow).

In order to make this series of articles on soils and soil cultivation fairly complete, and to give them a local setting, we have thought it wise to include a short article on the geological formations of the Province. Such an article has, necessarily, to be technical, and presumes a knowledge of geology and geological formations which is not likely possessed by many of the readers of this report. However, we think that those who have some knowledge of geology, and those visitors who may wish to acquire a comprehensive knowledge of the country, will find the matter which we have included in this article, helpful. In the ordinary sense of the word, the article is not a practical one, and hence, at the very outset, we recommend those who are looking through

*We have to thank Mr. R. W. Brock, Director Geological Survey, Department of Mines, Ottawa, and Dr. Ellis of the same Department, for reviewing this manuscript.

MAP OF NOVA SCOTIA

SHOWING GEOLOGICAL FORMATIONS.-



this report for practical information in regard to farming, to pass it over for others of a more exclusively agricultural character.

Geology and Soils.

Since soils are, for the most part, composed of fine particles of the rock of the earth's crust, it follows that a knowledge of the geological formations of any country will enable one to understand much of the character of the soils of that country. It is for this reason that we include, in this series of articles, a brief outline of the geological formations in relation to the soils of Nova Scotia. Before, however, discussing these formations in detail, we should explain that, from a geological standpoint, there are in Nova Scotia, as in most other countries, two classes of soils: (a) those formed by weathering from the rocks directly beneath, and (b) those that have been transported from other sources by glaciers, water, or, to a certain extent, by air. A large proportion of the soils, especially of northern Nova Scotia, have been transported by the ice cap of the glacier period, as well as other agencies mentioned above, and only in part partake of the character of the rocks immediately beneath. An exact geological survey of the soils of Nova Scotia is, therefore, an exceedingly difficult matter, and has not been accomplished. Nevertheless, a knowledge of the character of the rocks of Nova Scotia and their location gives a good general understanding of the character of the various soil formations, more especially since the bulk of glacial material has not been transported for great distances, and the direction of movement, and, therefore, transportation, may be determined. Consequently the reader who is familiar with the various soil formations of Nova Scotia will observe that, although there may be local differences, yet the soils of the different areas which we herewith define are, for the most part, of the type described.

The following classification of Nova Scotia soils is based upon the geological character of the underlying rocks:

1. The soils of the metamorphic district of the south shore region, occupying nearly half of the mainland of Nova Scotia proper, and consisting of (a) the lower, or classified by some as pre-Cambrian or gold-bearing rocks, and(b) granite intrusions. With this we include the igneous and pre-Cam-

brian areas of North Victoria County and parts of Cape Breton County in the vicinity of Louisburg, and along the Great Bras d'Or.

2. The soils of the metamorphic districts of the inland hills, including (a) Silurian and Devonian rocks to the south of the Cornwallis and Annapolis Valleys, and a small area near Bear River; also an area in Antigonish County, bordering on the Northumberland Strait, in the vicinity of Malignant Cove and Arisaig, and extending south-westward through Barney's River to Sunny Brae, in Pictou County and (b) the Devonian rocks, which occupy the Cobequid range of hills from Cape Chignecto to Earltown, and the hilly country from the sources of the Stewiacke through Pictou County, North Guysboro, and small areas in Inverness County from Port Hastings to Glendale, with a larger part of Richmond County, including the southern half of Isle Madame and the country extending from St. Peter's Canal and along the northern shores of Loch Lomond to its eastern extremity. Through this area there are considerable granite intrusions, constituting the greater part of the Cobequid Mountains and somewhat isolated areas through Guysboro County.

3. The soils of the Carboniferous system, including (a) loamy and marly soils of the lower Carboniferous system, as in Inverness County at Judique, Mabou, Margaree, Cheticamp, Whycocomagh, River Dennis, River Inhabitants, etc.; in Victoria County at Baddeck, Middle River, Ingonish, lands bordering on Aspy Bay and St. Lawrence Bay, and the greater part of Boularderie; in Cape Breton County, as at South Boularderie, North Sydney, Leitche's Creek, Coxheath, etc.; practically all of Eastern Antigonish; in Pictou County, the area from Bailey's Brook to Sutherland's River, bordering the Northumberland Strait, and also the areas along the East River, up to Sunny Brae; in Guysboro County, areas in the vicinity of Cross Roads, Glenelg and Caledonia; in Cumberland County, the area from Malagash to Wallace Harbor, extending south to Williamsdale, and also the area from Leicester to Barronsfield, including Maccan and Nappan. (b) Clays, sands and stoney grounds of the Carboniferous system, as from Sydney to Glace Bay and territory south and north, including the eastern end of Boularderie; the district in the vicinity of Westville, Stellarton, Thorburn, etc., in Pictou County, and districts in the vicinity of Springhill, Maccan and Joggins, in Cumberland

County. (c) The Permian (classed by European geologists as a separate period, but by American geologists as a sub-division of the Carboniferous) districts, including most of the lands bordering on the Northumberland Strait, from Merigomish Harbor to Bay Verte, with the exception of a small area described in 3 (a) from Malagash to Wallace. The same formation extends into Prince Edward Island, and constitutes the greater part of that country.

4. The soils of the Triassic or New Red Sandstone system, including (a) lands skirting either side of the Cobequid Bay, from Truro west, and including the Cornwallis and Annapolis Valleys; (b) the trap intrusion of the North Mountain, in Kings and Annapolis Counties.

5. The marine and river alluvia, the former the marshlands, more particularly along the head waters of the Bay of Fundy, and the latter the intervales along the numerous rivers of the Province.

6. Bog soils, scattered all over the Province.

District No. 1 constitutes practically all the southern lands of Nova Scotia, as in Yarmouth, Shelburne, Queens, Halifax, and Guysboro Counties, as well as the northern part of Victoria County and certain areas in Cape Breton County. This is an uneven but not very elevated country, (with the exception of North Victoria, which is quite elevated,) composed of slates, granite and quartzose rocks. It is full of lakes, and contains most of the barren lands of the Province. Over a large part of this district the land is so rocky and the accumulations of earth so shallow that agriculture cannot be successfully practiced. However, some of the finest forests of the Province are to be found in this district, and there are some quite extensive areas, as in Yarmouth, North Queens, Lunenburg, and along the banks of some of the rivers, where a high type of agriculture is practiced. Of the cultivable soils in this district, there are two well-marked kinds: (a) the granite soil, derived from decomposed granite, gneiss, and mica slate. These soils are coarse and sandy, and often covered with black vegetable mould. They are found in the areas of the granite intrusion, as in Shelburne County, the district from Chester to Halifax, and extending from there northwards into southern Kings, Annapolis and Digby, and considerable areas in Guysboro County, especially near Cape Canso. (b) soils of the slaty variety, occupying the greater part of this southern area. These are usually clay, generally stiff, though sometimes light and shingly. They constitute the greater part of the cultivable areas of Yarmouth County, North Queens, Lunenburg, the district of Halifax County running from Halifax city through Sackville, and extending into Mount Uniacke, Ellershouse, the Newports, the Gores, and Rawdon, in Hants County; also the greater part of South Guysboro. The cultivable soils of this area compare favorably with the best soils in the Province.

District No. 2 consists mostly of slates and shales, with also conglomerates quartzites, iron ores, limestone and intrusive granite. The soils derived from this intrusive rock are sandy and coarse in texture, but for the most part the soils of this district are decomposed slates, and consist of brownish loam and clays containing fragments of slates, which sometimes gives them a shingly character. In their natural state, these soils produce a fine growth of hardwood timber, and when properly farmed, they are not to be excelled in fertility by any soils. The soils of New Annan, Earltown, Pictou Hills and Northern Guysboro, as at Goshen Milford Haven, Guysboro, and the soils about Loch Lomond, in the County of Richmond, belong to this class.

District No. 3 (a) and (c) consist, for the most part, of loamy and marly soils, usually in the vicinity of large deposits of limestone and gypsum. By reference to the foregoing description, the reader will observe that in this district are to be found a majority of the most valuable upland farms of Nova Scotia. (b) The clays, sands and stoney grounds scattered irregularly over the carboniferous district in the vicinity of coal mines are generally inferior, although the clays, when under-drained and well tiled, prove very productive.

District No. 4, well typified by soils near Truro and throughout the Cornwallis and Annapolis Valleys, consists of soils varying from loams to light sands. These soils are generally of a bright red color, due to the presence of iron, though sometimes, as at Aylesford, being of a whitish color. These soils are fine, loamy and friable, particularly suited to fruit, potato, and garden crop culture. In Kings and Annapolis Counties these areas are flanked to the north by basalic trap, or lave hills, which have flowed through the new sandstone rock. The soils of these hills, being derived from slaty rock, are generally much heavier than those in the valley. They are particularly suited for the growing of oats and other grain crops. Unfortunately, many farms in this area have, through the systems of farming practiced, become exhausted of much of their virgin fertility. The soils at the southern base of these mountains partake, for the most part, of the character of the trap soils, and are much heavier than those to be found in the centre of the valley.

With the exception of glacial deposits, which are to be found in the shape of boulders, boulder clay, etc., all over the Province, more especially to the north, and local river and salt water deposits, such as the Bay of Fundy marsh lands, there are no later geological deposits in Nova Scotia than the Triassic. There are no deposits of the more modern Jurassic, Cretaceous or Tertiary periods which constitute the greater part of the formations of Alberta and Saskatchewan.

District No. 6 constitutes (a) the red Marsh, (b) the blue marsh, and (c) river intervales. The marsh lands (a) and (b) consist of soil swept up from every exposed bank and cliff by the great tides of the Bay of Fundy, and deposited at high tide in mud flats, which have gradually been added to until it was possible to dyke them and keep back the waters of the sea. These marsh lands are still in process of formation in some places along the waters of the Bay of Fundy. They vary considerably in texture, from light loams as part of the Truro marsh, to heavy clays, as at Grand Pre, in Kings County. They compose an area of about 50,000 acres, are extremely fertile and compare favorably with the best alluvial soils of the old and new worlds. There are, as described above, two classes (a) red marsh, and (b) blue marsh. The red marsh is, by far, the most extensive and by all odds the best and, when properly under-drained, the most important feature of marsh farming) has produced enormous crops without any added fertilizer for periods of sometimes over a century. The blue marsh or low marsh usually occur in a belt along the inner margin next the upland where the surface is lower than the outer edge, or in smaller areas scattered over the general marsh. The blue marsh contains large quantities of partly decomposed vegetable matter and the soil particles are very fine, giving the soil a smooth, cheesy sort of texture. Owing to the presence of large quantities of partly decomposed vegetable matter, the blue marsh gives off a fetid sulphurous odour.

The so-called Broad Leaf Hay, which is used extensively for cattle feeding in Cumberland and Kings Counties, is grown upon this marsh. In some cases, when under-drained and limed, this soil has been used for producing finer grasses, but only to a limited extent.

The intervales, or fresh water alluvia occur along most of the rivers of the Province and, while variable in quality, constitute, next to the marine marshes, the most fertile soils. In fact, any of the best agricultural settlements of the Province are located along and depend upon these intervale soils, as at Musquodoboit, Stewiacke, the Margaree, etc. Unfortunately, settlers have, in many cases, depended too much upon the natural fertility of those intervale soils, and have taken successive crops of hay so many years off these lands, without either plowing, or manuring that it is remarkable that they are even as productive as at present.

District No. 7, bog soils, consists of accumulations of vegetable matter in low, undrained localities, varying from peat bogs in which there naturally grows little but moss, to meadows of a boggy character, which grow alders and other small trees and natural grasses. These latter, when properly cleared and under-drained, constitute extremely fertile lands, but the former have not, up to the present time, at least, been turned to any agricultural account. These peat bogs are very abundant in district No. 1, along the south shore of the Province.

In the geological map (see page 7) we have indicated the areas occupied by all these formations, except those occupied by the marshes, the intervales and bogs. These latter areas are scattered so irregularly over the Province that it would complicate the map to indicate them in detail. The reader, however, will understand that along almost every river or creek of Annapolis, Kings, Hants, Colchester and Cumberland Counties, the waters of which empty into the Bay of Fundy, are to be found Marsh areas. Intervale areas are as numerous as the rivers and creeks of the Province, and these are very numerous. Bog soils are also very numerous, especially, as stated, in the southern formations of the Province.

THE CHEMISTRY OF NOVA SCOTIA SOILS IN RELATION TO THE GEOLOGICAL FORMATIONS.

By L. C. Harlow.

This article, as the preceding one, is more or less technical and may be passed over for the more practical article on soil composition page 22.

The geological formations are characterized by certain kinds of rock; for example, the slate of the Cambrian, red sandstone of the Triassic, gray sandstone of the Permian, limestone of the carboniferous. Since soil is broken up rock one might expect to find that, of a certain area, of the same chemical composition as the rock and uniform throughout the area.

Two factors tend to modify such a result and give a great variety of soils in any one geological area.

The first is, that layers of several kinds of rock may be found above or below the strata of the characteristic rock; for example the carboniferous has layers of organic matter as coal, sandstone and shales as well as limestone. The breaking up of these rocks will give, in situ, a complex soil of clay, sand, organic matter and limestone, *a residual soil.*

Secondly, glaciers, ages ago, the rivers coursing down the hills and valleys carry the eroded rock from one area to another; the eroded diorites of the Cobequids, the sandstone of the Silurian, and the limestone of the Carboniferous are mixed with the débris of the Permian rock by rivers such as the Wallace and deposited on rock of the Permian area as *transported soils.*

Soil consists of four parts.

Part one, the purely mineral part, was formed by the disintegration and chemical decomposition of igneous rocks such as granite and trap which are made up of quartz, feldspar, horn-blendes etc. This débris was deposited at the bottom of some sea or river.

Part two consists of the remains of water organisms; this material mingled with that of part one giving the soil its supply of carbonate and phosphate of lime together with a little organic matter.

In the course of time a great depth of these materials was accumulated which, in turn, by some change in the earth's surface became dry land or rock.

The mineral particles of a soil diminish in size very slowly; this is shown by the physical analysis of an old soil, cultivated for hundreds of years. The subsoil is compared to the surface soil which has been exposed to the action of the weather.

	Surface per cent.	Subsoil. per cent.
Fine gravel	3.5	2.6
Coarse sand	10.2	9.8
Fine sand	33.5	30.2
Silt	14.6	17.5
Fine silt	14.9	15.5
Clay	12.2	15.3

The third part of the soil is the water which circulates through the soil and dissolves very slowly, as a rule, its compounds. Those most quickly dissolved are compounds of lime and magnesia and to some extent potash; when the soil water is drained from a soil rich in limestone, 1429 lbs. of limestone per acre to the depth of 9 inches have been removed in one year. Since our soils are often sandy, and porous, the surface hilly, we might expect the soil water to carry away much of part 2, and some of part 1, leaving the soil largely composed of the original rock residues, a true residual soil. Now inorganic soil compounds are composed of two parts, the basic and the acidic; for example feldspar, of lime or potash for the basic, and silica for the acid part.

This leaching of the soil is found to take out more of the basic part of the soil leaving the acid residues to increase soil acidity. This is shown in the following table:—

	Potassium	Calcium	Phosphorous	Silica
Gneiss rock (Like granite in composition)	3.54	3.17	.11	28.
Decomposed Gneiss	.92	0.	.21	21.
Feldspar	11.64	.24	....	30.8
Clay from feldspar	.34	.11	....	22.8
Limestone (impure)	.29	32.	1.33	2.
Clay from this limestone	.80	2.8	1.11	16.

The fourth soil component is the residue of plants. A bare rock will grow a low form of plant, the lichen; this, in turn, gives way to a moss, this, to a fern and so on until the rock is covered with two or three feet of plant residue, the succeeding plants in turn using up part of the decayed substance of the former and adding to it the cellulose, protein, ash, etc, which it makes. This plant débris, consisting of mineral and organic matter, gives to surface soils their distinguishing characteristics.

These four groups of substances are usually present in varying amounts in all soils and give a basis for classifying soils. Thus we have in Nova Scotia from the agricultural point of view the following types:—

(1) Mineral soils consisting mainly of rock material divided into clays, sands and loams. Represented by 9, 11 and 12 in Table B.

(2) Calcareous soils, containing quite large quantities of limestone; represented by No. 4. These soils are quite rare in Nova Scotia.

(3) Acid humus soils where organic matter has accumulated in absence of calcium carbonates. For example No. 16 or most bog soils.

(4) Neutral humus soils where organic matter has gathered but in presence of sufficient amounts of limestone to prevent acidity. These are rare in Nova Scotia but No. 15 is an illustration. Probably 98 per cent. of our soils belong to class 1.

The table B page (20) gives the chemical analysis of some typical soils selected from over two hundred analyzed; these will enable one to compare soils common to the different geological areas as well as to have examples of the four soil types.

The following explanation of Table B may be of value to some.

Chemical analysis divides a soil into four parts; water, volatile matter, soluble and insoluble.

The soil is first air dried; then a part is taken for analysis as follows:—

1. Dried at the temperature of boiling water to take out the *water* which is only that known as hygroscopic.

2. Heated to red heat to drive out the combined water of clay and the organic matter. This is the so called volatile part; it is the characteristic compound of soil and

may vary from 98 per cent. in a peaty soil to 3 per cent. in a soil nearly free of organic matter. As a rule about 3 per cent. of the volatile matter is nitrogen.

3. A part is treated with quite strong hydrochloric acid; this leaves the insoluble part, clay, sand, etc. A soil with 90 per cent. of insoluble matter is usually a poor soil.

4. That which dissolves in acid is the mineral part of the soil which is available or will be made so by proper cultivation. It includes the potash, phosphoric acid, lime, magnesia, iron oxide, alumina, etc. Iron oxide is usually present in our soils in quite large amounts.

Iron oxide and alumina in three soils are as follows:—

	Iron oxide	Alumina.
No. 7	2.22%	2.94%
" 1	2.7 "	5.2 "
" 8	2.7 "	2.2 "

As a rule there, is a close relationship between the amounts of alumina, potash and clay. The alumina is about one-third the percentage of clay; potash is one-tenth that of the alumina or one thirtieth that of the clay.

TABLE A.

SUMMARY.

GEOLOGY *recognizes:*—	CHEMISTRY *analyzes:*—
(a) Rocks as granite, an igneous rock shale an aqueous rock sandstone an aqueous rock	(a) these rocks and finds:
(b) agencies as water, etc breaking up these rocks to form soil	(b) the drainage water from the land and finds in 6000 barrels river water:—
(c) Soil material as clay, sand etc. mixed	(c) the soils and finds them varying as—

(a) these rocks and finds:

Phosphoric acid	Potash	Lime	Silica.
.1%	4.	2.2	65.
.17 "	3.25	3.12	58.
.08 "	1.32	5.52	78.6

(b) the drainage water from the land and finds in 6000 barrels river water:—

Phosphoric acid	Potash	Lime	Silica.
.3 lbs.	2.4 lbs.	43. lbs.	16. lbs.

(c) the soils and finds them varying as—

	Phosphoric acid	Potash	Lime	Silica.
Marsh	.18%	.98	1.05	67.
Sandy soil	.12	.12	.025	92.

These figures show the large amounts of important mineral elements in the rocks, the loss by leaching of the lime content, the much smaller loss of phosphoric acid and potash.

Reference to the availability of these elements will be made in the more general article on soil properties page 22

TABLE B.

Chart Showing Analysis of Soils from Different Geological Areas of N. S.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		16
Water.......	6.65	2.10	3.35	.....	2.25	1.75	1.41	1.20	1.30	4.85	1.24	.82	2.62	2.25	12.60	Water	24.2
Volatile.....	10.85	9.60	6.95	.....	6.25	13.50	6.54	5.35	3.15	5 95	4.29	3.32	5.75	8.55	59.85		
Potash......	.30	.30	.19	.....	.28	.25	.29	.26	.14	.26	.79	.61	.48	.52	.135		
Phosphoric acid	.27	.064	.13	.....	.16	.32	.14	.09	.06	.18	.18	.05	.19	.17	1.56	Organic	74.97
Lime........	.35	.55	.20	45.00	.40	.20	.42	.25	.15	.15	.68	1.15	.60	.40	3.40		
Magnesia....	.38	1.13	.83	.36	.54	.18	.52	.28	.04	1.22	1.25	.97	.78	1.66	.10	Potash.....	.007
Soda........	.30	.55	.08	.....	.08	.13	.15	.40	.07	.63	.63	.78	.88	.30	.295	Ash	
Sulfuric Acid:	.....	.10	.08	.....	.25	.17	.10	.14	.35	.07	.12	.28	.96	.19	.56	Phosphoric Acid.. ...	.17
Ferric Oxide and Alumina.	6.25	6.99	9.80	1.00	7.00	8.48	5.16	4.96	1.65	10.50	9.20	7.50	11.40	11.88	11.87	Lime.......	.65
Insoluble....	73.78	78.89	78.75	19.00	81.71	76.40	86.08	87.18	93.43	76.22	82.70	84.76	76.24	75.29	8.47		
Nitrogen....	.34	.495	.120	.....	.17	.31	.15	.14	.10	.12	.08	.06	.24	.50	1.80		
Total Limestone...	.....	.....	.....	80.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....		

Explanation to Table B.

1. A surface soil from Lunenburg Co., N. S.
2. A soil from the Devonian rock area, North River, Col. Co.
3. A soil from the Silurian rock area, South Mt., Kings Co.
4. A marly soil from the Carboniferous area, Cape Breton.
5. A soil from the Carboniferous area, Kennetcook, Hants Co.
6. A soil from the Carboniferous area, Bridgeport, C. B.
7. A soil from the Permian area, Brule, Col. Co.
8. A red Triasic sandstone soil, Truro, N. S.
9. A white Triassic soil from Berwick, N. S.
10. A soil from the base of the trap intrusions, Kings Co.
11. A new marsh soil from the head of Cobequid Bay, Col. Co.
12. A new marsh soil from near Wolfville, N. S.
13. A blue marsh mud from Cobequid Bay, Col. Co.
14. An interval soil from Stewiacke Valley.
15. A bog soil from Kings Co.
16. A bog soil from Shelburne Co.

CHEMICAL AND PHYSICAL CHARACTERS OF THE SOILS OF NOVA SCOTIA.

By L. C. Harlow.

Can the average person look at a soil and pronounce upon its suitability for crops?. Just recently two samples were submitted for analysis, the senders calling them samples of clay. In one case, the so-called clay was 95% carbonate of lime, a soil, in itself, of little agricultural value; in the other case, the material was a diatomaceous earth, largely silica with very little plant food. The fineness of particles was the sole factor used in deciding any specimen to be a clay, a designation that would lead one to consider these as strong soils.

The demand for more definite knowledge of soils has led agricultural departments, the world over, to carry on field study, to compare and analyse soils. This work done systematically over any given area enables one to know approximately the kinds of soil to be met with together with the amount of plant food, total and available, in any soil of that area.

This work of determining the actual constituents of a soil is comparatively easy; but, when the Agricultural Chemist is asked to analyze a soil and give some information about the crops to which it is best suited, or to recommend fertilizers which must be applied to give the best returns, the problem is much more complex since other factors as climate, slope of the land, nature of sub-soil, etc. assist in determining the crop producing power of a soil.

Hence, it is recognized as a wise policy that the chemist should co-operate with the farmer in manurial and other field tests of any soil being studied.

Soil analysis, to be of real value, should be physical as well as chemical. The idea prevailed, at one time, that chemical analysis, which determined the total amount of plant food, was sufficient. In present day soil study more and more emphasis is being put on physical analysis, which divides a soil by sifting and sedimentation into various fractions depending upon the size of the particles, and on physical properties of the soil, a study which results in the rational use of the plow, harrow, manures, commercial fertilizers and lime.

Some such study has been made of a few Nova Scotia soils, and information such as is given in any column of

Table I and comments on the same is sent out regarding each sample.

In studying soils the terms rock and mineral are much used; the distinction is worth keeping in mind. A *rock* like granite, is a *mixture* of *minerals* which are single substances, like quartz or limestone. A rock always has some plant food, some minerals none.

The particles of the soil may be little pieces of *rock* such as granite which is made up of a number of different minerals as quartz and feldspar; such a soil, made of the decayed rock and deposited where the rock was, is known as a *residual soil.* On the other hand, if the broken up granite be transported by water for example, the clay from the feldspar is carried many miles away and deposited in a fairly pure state; the sand from the quartz is not carried as far but is deposited free of other material. Thus may be formed a heavy clay or a light sand known as *transported* soils. Ordinarily, however, the clay and sand are mixed in varying proportions, giving the great variety of soils and the need for physical analysis.

Soil is that part of the earth's crust in which plants will grow; it consists of pulverized rock mixed with animal and vegetable matter.

The animal and vegetable matter may be well decomposed giving that complex material known as humus or it may be very little decayed giving a constituent of very little direct value to the plant.

The rock particles may be of different kinds and sizes as clay, silt, sand or gravel. If the granite rock be broken up giving two kinds of soil, the one fine, the other coarse, the difference is only *physical.* If, however, one soil is formed of sandstone while another is formed from slate, the soil particles in the two cases being different in size then the difference is *chemical* as well as *physical.* The chemical and physical properties together, determine the value of a soil for any particular crop.

Most of our soils are composed of fragments of various kinds of rocks, which are made up of minerals of different chemical composition and in different proportions in the rock; hence they will differ both physically and chemically.

Many of the important physical properties of a soil are dependent on the size of the soil particles which may run from the microscopic to the coarse sand and gravel. The fine earth, which consists of all particles less than 1-50 of an inch in diameter is the important part since it furnishes the available plant food.

In analysis this fine earth is divided as follows:—

	Size of Particle.	
Medium sand	$\frac{1}{50}$ to $\frac{1}{100}$	inches in diameter.
Fine "	$\frac{1}{100}$ to $\frac{1}{250}$	"
Very fine "	$\frac{1}{250}$ to $\frac{1}{500}$	"
Silt and fine silt	$\frac{1}{500}$ to $\frac{1}{5000}$	"
Clay	$\frac{1}{5000}$ and less	"

This grouping usually has added to it the following:—

	Diameter of Particle.	
Gravel	$\frac{1}{10}$ to $\frac{1}{25}$	inches
Coarse sand	$\frac{1}{25}$ to $\frac{1}{50}$	"

Since the properties of a certain soil will depend, to quite an extent, upon those of the predominating fraction it will be necessary to consider the characteristics of sand, silt and clay quite fully.

Physically, the term sand refers as above to *any* soil particle of certain sizes;chemically, it is quartz, more or less finely pulverized; since this substance is practically useless as far as plant food is concerned it follows that soils with a high percentage of sand are poor. The "sands of the desert" suggest to any one a sterile soil.

Fine sand forms 10 per cent. to 30 per cent. or more, of nearly all soils; it has cohesiveness and will cake to some extent, but it will not hold water and maintain a moist condition as well as finer soil. If there is 40 per cent. of fine sand, there will form after a rain a hard crust through which young plants may find difficulty in forcing their way.

Coarse sand varies in amount to quite an extent; its properties are the reverse of those of clay; hence, it aids a great deal in determining fertility. Through its lack of cohesion it keeps a soil open and friable; it aids working, if, in moderate amounts; but in excess, it increases drainage, and evaporation to such an extent that the water-holding power of a soil is seriously interfered with. Many good soils have only 4 per cent. of coarse sand and, as a rule, good soils have less coarse sand than half the percentage of clay. Sandy soil, unlike clay or fine silt, cannot absorb water or soluble salts so that if a soil has 40 per cent. of coarse sand and only 5 per cent. of clay it must be continually supplied with stable manure.

Clay, physically, is made up of those soil particles less than $\frac{1}{5000}$ of an inch in diameter, without regard to chemical composition; it may be quartz, feldspar, limestone or any rock or mineral finely pulverized.

Chemically, clay is a substance usually formed from a feldspar which is made up of potash, alumina and silica; as the feldspar is disintegrated the potash is dissolved out and replaced by water making pure clay, a substance which in itself is useless as a plant food. Clay soils are usually fertile on account of the other minerals and organic matter held by the clay and by the incomplete removal of the broken up feldspar.

In a true clay the separate particles are so small that they remain floating in water for a long time; so in order to determine whether or not there is clay in soil, thoroughly shake up half a teaspoonful with some rain water in a clean bottle; if the water remains cloudy for twenty-four hours, there is more or less clay according to the amount of cloudiness.

One of the important properties of clay, is shown by putting a speck of salt, gypsum or lime in the cloudy clay water; the turbidity soon disappears because the fine particles group themselves together into clots or they are said to flocculate. This is one of the important effects of lime when applied to clay soils; this is not a permanent change for as soon as the lime or salt is washed away the cloudiness appears again or deflocculation has taken place.

The clay properties are of great importance to the fertility of the soil and no constituent is more necessary or more harmful in excess. Clay impedes the movement of water in the soil and keeps it in the surface layers within reach of the plant roots. Excess of clay, however, interferes too much with the water movement, making the soil waterlogged in wet weather and parched in dry seasons even though the water level is near the surface. It also impedes the movement of air to the roots and lowers the temperature of the soil. The adhesive properties of the clay cause the sand as well as the clay particles to stick together, giving coarse particles which make a soil in good tilth. Soil with no clay would be like a heap of sand. On the other hand excess of clay does harm because it becomes so sticky that it interferes with the tillage implements and forms on drying large clods, and in dry weather the surface shrinks so much that large cracks appear. Lime or limestone and organic matter applied to such a soil much improve the physical condition. One of the benefits of a proper amount of clay in a soil is that the ammonia and potash fertilizers are broken up by the clay. The ammonia and potash are held for the use of plants; this being in marked contrast to a sandy soil. The finest clay is, when dried, like glue; when wet, like thick boiled starch; it is known as "colloid clay;" this is the material in the soil which absorbs the soluble manures. In general, about 6 per cent. to 16 per cent of clay is a satisfactory amount under the ordinary rainfall of Nova Scotia, though in heavy soils it may run as high as 50 per cent.

Many of our heavy soils, clay like in nature, contain a large percentage of silt; this is the fine material which is deposited in ditches and drains where the water is running very slowly. It is made up of a great variety of rock particles in size between sand and clay. While clay soil is nearly impervious to water and when wet works with difficulty, a silt soil is much more permeable and easily worked but is not open like a sandy soil.

As shown in Table II the silt may be divided into two fractions, the coarse and fine silt; the latter, like clay, has great water holding power and if over 15 per cent, especially if much clay be present makes the soil hard to work. The coarse silt, if about 30—40 per cent., makes a very strong soil carrying crops well and not drying out; it maintains even moisture conditions retarding but not preventing the downward flow of water and in dry times faciliating the upward flow. A light sandy soil, with 15 per cent. of silt may be very fertile. Silt, no doubt, is a very useful soil constituent, both from the physical and chemical standpoints.

Fine gravel is not usually present to any great extent and is injurious only when the coarse sand is too high or when a bed underlies other soil; if it is mixed with a clay soil it is beneficial.

These soil components clay, silt and sand do not form a mere mixture. There is almost a state of combination of the particles, strong mechanical or gentle chemical means being needed to break it up. This formation of the compound particles is due to carbonate of lime and colloid clay; hence the properties of a soil are not due to the sum of the properties of the separate fractions, clay, fine silt, etc. It is true that it is only the finest part of the soil which takes any marked part in this formation of compound particles.

In soil study emphasis must be put upon the colloid material of the soil; if we regard the mineral particles sand, etc. as the soil skeleton, the colloids become the clothing giving the special characteristics of any soil. Various views are put forward regarding how this colloid material is held. But one of the simplest is that each mineral particle of clay, silt or sand is coated with a thin layer of silica, alumina, potash, lime, phosphoric acid and humus. This mixed layer is easily decomposed by changes in temperature, by plowing soil when wet and by the action of fertilizers.

From the chemical standpoint, these seven fractions given in Table I may be put into two groups. The gravel, sand and most of the silt are largely silica while the finest silt and clay contain a much larger proportion of alumina, iron, lime and potash. Too few analyses of these fractions of Nova Scotia soil have been made from which to make an average but such as have been made accord with the following table given by Hall and Russell of England.

Interpretation of Physical Analysis in Table I.

The physical analysis of numbers 3 and 6 in Table I show extreme percentages of the opposite fractions, clay and gravel. Number 3 is a very heavy clay soil; there being very little gravel, coarse sand or organic matter, such a soil will have all the characteristics of a typical clay soil; it needs drainage, thorough cultivation and additions of organic matter; with a free subsoil it is adapted to fruit or wheat; it is the heavy clay wheat soil.

Number 6 is a fine, sandy soil; the lack of clay is partly overcome by the presence of silt; but the quite large amounts of gravel and coarse sand with the high per cent. of fine sand render it too porous, unable to retain water or soluble food; such a soil if provided with organic manures would be suited to potatoes or small fruit.

A good type of potato or early truck soil contains 60 per cent of medium and fine sand, 30 per cent of silt and 5 per cent of clay; such a soil with about 3 per cent of organic matter will hold about 15 per cent water. Sandy soil gives up its water readily to the plant, so that the plant gets the amount needed and grows rapidly in the warm sandy soil; this soil has an abnormally low per cent. of nitrogen so that additions of stable manure will make a better soil especially for dry weather.

Number 10 has the effects of 12 per cent. of clay offset by 20 per cent of coarse sand and gravel.

General garden and small fruit need a soil with 10—15 per cent. of clay and 50 per cent of sand.

Number 9 would probably be best suited for this purpose. The total plant food and organic matter, from chemical analysis would indicate a good soil.

Number 5 is a silty loam; such a soil with not too loose a subsoil is good for wheat especially in this Province; the heavy clay of number 3 is too late getting warmed up. Number 6 makes the medium clay soil.

Numbers 1, 2, 4, 7 and 8 are representatives of many Nova Scotia soils. Grass and grain require a good supply of water; silt and very fine sand hold large amounts of water and give it up to the plant so much more readily than does clay; 10 to 15 per cent of clay and 50 to 70 per cent. silt and fine sand make a typical grain and grass soil.

The interpretation of a physical analysis of a soil is modified by several factors such as the amount of organic matter, carbonate of lime, water supply and climate.

Organic matter when properly decomposed has the effect of binding a loose soil and lightening a heavy one; thus it reduces the difference between the heavy clay and the light sand, making both closer to the loams. When about 12 per cent. of organic matter is present it so impresses its value on the soil that the physical analysis loses much of its usefulness; but the analysis holds good if, by poor management, the organic matter is reduced below a certain point. The organic matter must be well decomposed; often a barren land has 10 per cent of organic matter which has not been broken down by decay; this material often injures the physical condition.

Carbonate of lime, to the extent of 1 per cent., may greatly modify the clay properties and give a degree of friability to a soil which would otherwise be almost unworkable. Much more carbonate of lime than 2 per cent. has such striking effects, that the analysis looses its meaning.

The water supply, as determined by rainfall, underground water and nature of subsoil has much to do with the meaning of a physical analysis.

High rainfall minimizes the value of the water holding power, so that a light soil under such conditions behaves like a heavy soil under low rainfall. The rainfall and comparatively cool summer of Nova Scotia enables the sandy soils to stand out among our best, whereas if they were in a dryer climate, would be barren soils.

Underground water about 3 feet from the surface will make a sandy soil almost as valuable for the clay land crops as clay itself; this partly explains the well known fertility of valleys.

From the physical standpoint the wide variations in Nova Scotia soils found on areas but slightly separated seems to favor mixed farming, stock raising and dairying.

From the foregoing, physical examination, whether a full analysis or not, is of great value in adapting crops to soil conditions. The soil is so complex in its relation to crops that it has been and still is one of Nature's greatest puzzles. One must not conclude that a rational soil treatment is an easy matter, a matter for "rule of thumb." It calls for the most careful observation, for all the available knowledge possible and for judgment; a full physical analysis will certainly be of value to the scientific farmer.

The analyst must consider a soil from three points of view; (1) its physical properties, especially those relating to ease of soil-water movement. (2) Its store of plant food actual and total. (3) The rate at which the latter, insoluable or unavailable food can be changed to actual food.

Chemical Analysis.

Chemical analysis or not? That is the question. "Man shall not live by bread alone;" this principle extended induces one to say that the farmer cannot live by chemical analysis alone.

Some have claimed everything for it; others say, it is of no value since on soils which analysis says should be fertile, poorer crops are produced than on those where there is less plant food shown by analysis.

Some say that the plant alone is the only guide in the question of fertility, that whether a soil is worth cultivating or not depends upon whether a certain crop, clover for example, will thrive upon it. Will every person thrive on a diet of raw potato? No; for much the same reasons we cannot decide that a soil is of no value if judged only by its inability to give a paying crop of a certain plant. Those who make such a claim have regard, no doubt, to immediate productiveness and not to permanent value; they are the farmers just for today with no regard for the future usefulness of the land.

The soil is Nature's store house of plant food. Emphasis is being put, more and more, on such facts that 1 per cent. potash means 20000 lbs. per acre, 6 inches deep, worth $1000, if put in a usable form for the plant. Three lines of study will each give some valuable information about the locked up material in the soil; these are (1) judging from the growth of the plant (2) physical analysis (3) chemical analysis. All agree on the importance of the first method of study; the place for physical analysis has been pointed out; what is the field for chemical analysis?

The chemist aims to determine the amounts of plant food.

Silicate of lime and silicate of potash are two definite minerals found in the soil; either one of these broken up to a certain size gives sand. Physical analysis determines this. Chemical analysis will discover in such sand perhaps 80 per cent. silica, 10 per cent, lime and 10 per cent. of potash, a very incomplete soil as far as the plant is concerned. Again, either silicate of lime or silicate of potash would give a sand; if the former chemical analysis would show perhaps 85 per cent. silica and 15 per cent. lime, a still more incomplete soil.

The chemist then without regard to clay, sand etc. breaks the soil up chemically and gives the amounts of each component, the total of which, if a complete analysis be made, should be 100 per cent. If potash or phosphoric acid did not constitute part of the rock which formed the soil or if, in the course of time, it has all been carried away by water or cropping, then chemical analysis will give valuable information, a soil *totally* deficient in potash or phosphoric acid. One reason for the plant not thriving is then seen and at least one course of action is open, the application of the needed food, either in organic or mineral form.

Table III shows in column A the elements found in plants divided into three groups (a) those which will pass off by heating, burning or decay (b) those found in the ash (c) those not considered necessary for plant development. In column B the source of these elements. C gives the term the chemist applies to the compound containing that element. Nos. D to I give typical analysis of poor, good, surface and subsoils, the percentages given being for those items in column C.

Table IV shows the amounts of acid soluble plant food in soils per acre, 6 inches deep, and the amounts taken by staple crops. For practical purposes, it is not necessary to find out the amounts of all the soil constituents; in table IV, the small amounts used by the plant and the large amounts present in the soil together with experiments with fertilizers make it evident that sulphur, iron, calcium, and magnesium, of the necessary elements, are present in sufficient quantity, as *direct* plant food in all our soils.

Recourse then, is had to chemical analysis to discover the amounts of plant food. First, the part, which corresponds to one's loose pocket money, is the so-called available portion or that which is ready for use when the plant starts; this is the part which, to some, indicates a soil to be rich, even though it be only for a season or two. The plant as well as analysis can demonstrate the presence or absence of soluble or available food. Second, the part which corresponds to one's bank account, is the dormant supply; it is drawn upon in emergencies only by the properly qualified person, the drawer of the check. The soil supply responds only to the man who is equipped with knowledge, patience and the willingness to cultivate. The amount of this part is revealed only by chemical analysis.

In making the inventory of the soils' supply of food it is necessary to include only *nitrogen*, *phosphoric acid* and *potash*. Table IV shows the large amounts of these present in soils. The question of the value of these will be referred to in the section on available food.

The story of the advance of scientific agriculture has fully demonstrated the place of chemical analysis in soil study. The factors especially considered by the chemist are; (1) soil acidity with the lime content especially the carbonate form, (2) the amount of organic matter and nitrogen, (3) potash, (4) phosphoric acid.

(1) Whether a soil is acid, neutral or alkaline is very important because plant food exists in a different form in each case. Chemical analysis *with acid* always shown from .1 to. 5 per cent. lime; but if the soil shows an acid action with litmus paper it may be concluded that this amount is present as silicate of lime which is inactive as far as assisting decay and neutralizing acids are concerned. It follows, that a determination of the amount of carbonate of lime, the substance found in nature in large quantities which corrects many bad soil conditions, will be of value; such a form of lime cannot exist if the soil is acid. Nova Scotia soils are uniformly acid and need free lime in some form. This topic is further discussed in the article on lime.

(2) Organic matter may be a large part of the loss of weight due to burning and heating a soil. The analyst is supposed to find whether the organic matter is changed by decay to humus or whether it still shows plant structure. Organic matter may be considered to have 3 per cent. nitrogen in it; so that, if a soil has 5 per cent. organic matter it has .15 per cent. nitrogen. If the organic matter is all humified then this nitrogen is available. Soils which are acid are usually deficient in nitrogen because the plants like legumes have not grown on such soils to increase the supply. Lime, then, indirectly will add to the soil store of nitrogen.

When a soil has much clay the percentage of volatile or organic matter is quite high; this is due to the fact that clay has a certain amount of water which is volatilized by strong heat. When a soil has below 2.5 per cent. of humus the supply is poor; from 2.5 to 5 per cent. fair and from 5 to 10 per cent. good. Nova Scotia soils will average about 7 per cent. of total volatile matter some of it being, on account of acid conditions only partly decomposed and therefore not able to give up its nitrogen which should be at least. 1 per cent.

(3) Potash in our sandy soils runs as low as .1 per cent. this amount may do for some time as it is equivalent to 2000 lbs. per acre 6 inches deep, an amount if available to last for many crops. A loam has .3 to .45 per cent. while a heavy clay may have as high as 1. per cent. As a rule soils with less than .25 per cent. are likely to need potash applications unless lime and cultivation be made to assist in setting free the dormant potash.

(4) Phosphoric acid is present in the soils of the Province to the extent of .2 per cent. on an average; this is a good percentage provided lime be present as the carbonate. If no lime is present the phosphate is locked up with the iron compounds which are quite abundant in our soils. In cases where slag and phosphate fertilizers are used with good effect it is possible that an application of lime would not only destroy "sourness" which is so common but would also set free some phosphoric acid. In virgin soils .1 per cent. of phosphoric acid, when lime is present, will give good yields for ten to fifteen years.

Availability.

Available plant food is that which is able to be dissolved by the soil water and so taken up by the plant.

The total amount of potash, phosphoric acid, or nitrogen appearing in a chemical analysis may all be available or none of it may be.

One soil analyzed had a total potash percentage of .902; of this only .02 per cent. was available by the method of dissolving in a weak acid .149 per cent. was dissolved by strong acid and .737 insoluble. The last two amounts, totalled give .886 per cent. which is the unavailable potash. Sandy, and peaty soils respond to potassic manures, because these soils are so often acid, a condition opposed to potash being set free.

The amount of available food depends not upon one condition but upon a number of factors. (1) The actual condition of the compound in the soil, at the beginning of the growing season; for example is the substance in the soil muriate of potash or an insoluble silicate of potash. (2) Is such a substance, naturally available, enclosed by soil particles so that the roots cannot get at it?

(3) The amount which the air, water, etc can set free during the season.

(4) The nature of the plant. Plants differ in their ability to absorb food.

Roughly, with the practical methods of farming, 2 per cent. of total nitrogen, 1 per cent. of total phosphoric acid and 1-4 of 1 per cent. of the total potassium can be made available during the season; referring to table IV, the importance of proper treatment in making useful the great store of plant food, is evident.

The following table gives an idea of the availability in Nova Scotia soils of some of the elements of plant food:—

	LIME		POTASH		PHOSPHORIC ACID	
	Acid soluble	Available.	Acid soluble	Available	Acid soluble	Available
1—Good soil	1.64	.99	.27	.048	.23	.087
2—Virgin soil	.04	0.	.145	.105	.026	.011
3— "	.36	.15	.37	.019	.11	.023
4— "	.11	.02	.42	.018	.064	.023

As a rule our soils need treatment such as cultivation and limestone applications to assist in rendering more food soluble; more emphasis must be put on the *quality* of the plant food and less on the *quantity*; soil treatment changes the *quality*.

Black or Humus Soils.

Table III J. and K. give the analysis of two soils representing a type about which there is very much doubt concerning the value. These soils are scattered all over the province in small areas, as a rule, and are made up of organic matter; they are known as humus, peat or muck soils. From the fact that the organic matter is often almost entirely covered with water there is only partial decay. There is usually a marked deficiency in potash, a good supply of phosphoric acid and lime in combination with the organic matter. The decay has gone on so long that acids have accumulated giving very sour soils.

As a rule such soils need drainage, application of potash salts and lime to neutralize the acids. Sample K. especially shows so little mineral matter that the soil may be considered very poor. In some cases there is as much as 98. per cent. of organic matter. Such material is found to be very serviceable as an absorbent in stables; when put on the land the high per cent. of nitrogen and phosphoric acid is supplemented by that of the manure giving a very valuable addition to the land, especially if the organic matter is needed to lighten the soil.

TABLE I.

Chemical Analysis	Brookfield Colchester Co. 1	Dartmouth 2	Foot of North Mt. Lakeville Kings Co. 3	Bridgeport C. B. 4	Selma Hants Co. 5	Maitland Hants Co. 6	Milford Hants Co. 7	Marsh Mud Cornwallis River 8	Nictaux West Annapolis Co. 9	Berwick Kings Co. 10
	%	%	%	%	%	%	%	%	%	%
Nitrogen	.23	.18	.104	.31	.23	.002	.072	.128	.29	.16
Phosphoric acid	.29	.32	.384	.32	.46	.32	.128	.15	.13	.30
Potash	.59	.325	.23	.25	.85	.22	.23	.25	.17	.21
Lime	.10	.2	.30	.20	.72	.4	.05	1.40	.45	.50
Magnesia	.34	1.008	1.04	.18	1.47	.46	.72	.48	.30	.09
Water	1.45	4.75	1.5	1.75	3.75	1.85	1.4	3.45	2.95	3.05
Volatile and Organic matter	9.10	14.8	5.05	13.50	9.50	6.3	4.7	4.14	11.20	7.10
Insoluble clay and sand	75.18	69.81	84.66	76.40	72.50	84.20	83.32	75.59	77.16	83.53
Soda	.33	.3	.3	.13	.29	.10	.23	.5	.24	.46
Iron oxide and alumina	11.71	7.52	7.51	8.48	10.45	6.50	7.17	11.71	7.97	6.50
Sulphuric acid	.22	.1	.103	.17	.22	.085	.09		.12	.25
Physical Analysis										
Gravel	1.16	10.90	.40	1.80		3.30	2.56	.125	15.1	9.71
Coarse sand	1.26	5.86	1.80	4.32		6.05	5.56	.26	7.2	19.40
Medium sand	2.36	6.36	3.00	3.91	2.20	7.50	5.96	1.48	4.1	52.14
Fine sand	11.76	15.96	11.50	12.09	7.10	29.80	18.76	4.06	13.4	
Very fine sand	33.96	22.76	13.30	43.79	29.70	57.20	29.10	46.01	25.	
Silt	35.50	21.04	12.50	23.18	40.20	15.30	21.44	35.5	25.8	6.55
Clay	14.00	17.06	57.50	10.91	20.80	.85	16.56	5.8	8.2	12.19

Analysis of No, 8 done at Ottawa by Prof. Shutt.

TABLE II.

		Silica	Alumina	Iron Oxide	Lime	Magnesia	Potash	Phosphoric Acid
Sand....	I	94.	2.	1.2	.4	.2	1.2	.03
Silt.....		87.	6.	2.	1.	.2	2.7	.06
Fine salt.	II	64.3	19.3	7.6	2.2	.4	5.3	.4
Clay....		53.2	21.2	13.2	1.6	1.	4.9	.4

This shows between groups I and II a marked difference in the amounts of important elements as potash, phosphoric acid and lime.

TABLE III.

A	B	C	D	E	F	G	H		I		J	K
Plant Elements	Source	The term used by one in speaking of fertilizers	Good Soil Antigonish Co.	Marsh Soil Yarmouth Co.	Poor Soil Digby Co.	Average of 200 Surface Soils of United States	Kingston Annapolis Valley		Truro		Berwick Kings Co. Peat Soil	Milford Hants Co. Peat Soil
							Soil	Subsoil	Soil	Subsoil		
Oxygen	soil and air	Organic matter	11.68	18.40	11.12	x7.00	13.00	11.15	6.95	4.30	59.85	89.00
Hydrogen	water	and water	4.46	5.90	2.37	.....	4.55	2.60	1.65	1.70	12.6	8.75
Nitrogen	Soil	The important part of the organic matter is *nitrogen*	.24	.77	.21	.29	.068	.13	.15	.013	1.8	1.06
Carbon	Air											
Sulphur	soil	sulphuric acid	.09	.60	.08	.03	.09	.1	.08	.07	.56	.17
Phosphorus	soil	phosphoric acid	.29	.16	.002	.24	.13	.09	.22	.11	1.57	.224
Potassium	soil	potash	.5	.37	.15	.29	.63	.73	.22	.31	.13	.04
Calcium	soil	lime	.5	.5	.3	2.16	.03	.05	.40	.05	3.4	.2
Magnesium	soil	magnesia	.49	.11	.74	.55	.40	.65	.26	.31	.11	.4
Iron	soil	iron oxide	3.05	*5.64	*9.1	2.68	*7.47	*8.31	*6.45	*7.5	*11.87	* .38
Chlorine	soil	chlorides	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silicon	soil	sand, insoluble	72.93	67.66	76.73	79.95	72.54	75.47	84.11	86.06	8.47	1.52
Sodium	soil	soda	.04	.88	.16	.25	.28	.27	.01	.16	.29	.1
Aluminum	soil	Alumina	5.88	.....	.....	5.20	.....	.....	.....	.....	.....	.....

*Iron Oxide and alumina are put together,
xOrganic and water put together.

TABLE IV.

The amounts of plant food per acre 6 inches deep dissolved by strong acid and food removed by two crops in two successive years.

	Potash	Phosphoric acid	Nitrogen	Magnesia	Lime.	Iron Oxide	Sulphuric ic acid
Average of 50	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Nova Scotia soils, marsh, upland and intervale	10000	3000	4000	8000	4000	60000	1000
Oats 50 bus., straw $1\frac{1}{2}$ tons	45	18	45	9	12	2.2	4.5
Clover, 4 tons	148	51.	205*	53	165	5.5	16

*As a rule, two thirds of this amount is taken from the air.

HUMUS *THE MOST IMPORTANT ELEMENT IN A FERTILE SOIL

M. Cumming.

Humus is a mixture of dark tinted substances resulting from the decay of roots, leaves, twigs and other vegetable as well as animal remains in the soil. It imparts to the surface soil that more or less dark color, the most obvious mark of distinction between the soil and the sub-soil. It is the principle source from which plants obtain their nitrogen; and it also contain a considerabls portion of the mineral elements (phosphorus, potash, lime, etc.) upon which plants live. It improves the texture of soils and conserves the water supply. Besides, it is the medium in which numerous species of bacteria live which, by the acids they set free, unlock the stores of plant food contained in the inert rock particles. It is the most essential ingredient of a fertile soil.

If the supply of humus in a soil could not be controlled by the methods of farming pursued one would have little excuse for including an article upon it in this series. Fortunately, it can be, as the following illustration proves:—

An Illustration.

Snyder, Chemist at the State Agricultural College, Minnesota, describes two farms, side by side, containing originally the same amount of humus, and which were farmed on different lines for 35 years with the following results: Farm No. 1, cultivated 35 years with a regular rotation of crops and application of barn yard manure made from crops grown on the farm, contained at the conclusion 3.32% humus and was very productive. Farm No. 2, was continuously grain cropped for the same period of years and at the conclusion contained 1.80% humus, and was at a low state of productiveness. The illustration is typical of numerous farms and fields not only in Nova Scotia, but in the whole Dominion of Canada, the present productiveness of which is largely the result of the kind of farming pursued. In the latter part of this article, the underlying principles which were responsible for these results will be discussed.

*Note—By many authorities, the term humus is applied on to organic matter when it has become so decomposed as to have lost all trace of the tissue of the substances from which it was found, and has become an integral part ot the soil mass. Others embrace all the organic matter of soils in the generic term "humus". It is in this latter sense—as embracing all organic matter ot the soil—that the term is used in this article.

Quantity of humus in soils.

In good soils, such as the undepleted soils of Nova Scotia, humus is present to the extent of .75 to 2.5%. In rich prairie soils the percentage may be as high as 3.5% and even more. In soils which have been long cultivated without proper regard to rotation and without the application of barn yard manure, the quantity of humus present may be reduced to such an extent as to make cultivation unprofitable. For the most part the amount of humus present can be recognized by the shade of darkness of the soil.

Sources of humus.

Humus is derived from both plant and animal remains, but largely from plants. In our forests, leaves, twigs, etc. fall to the ground and gradually, through the action of bacteria, are reduced to humus. Early settlers tell of the large crops produced on the virgin soil reclaimed from the forest, and they also tell how much less their crops suffered from summer droughts than at the present time. The difference is largely one of the humus content of the soils. Those farmers who have followed a rotation of crops and have fed most of the products of their farms to cattle, have farms that are today as productive and in some cases more so than in the early days after they were reclaimed from the forest. Such farmers have kept up the humus supply. Unfortunately, however, many farmers in Nova Scotia have not practiced a rotation of crops and have not depended sufficiently upon live stock, as a result of which their farms have become depleted of their fertility—their farms lack humus.

No run out farms where the humus supply is conserved.

If all farmers of Nova Scotia rotated their crops and kept live stock as in the foregoing, there would be no decrease in the humus of their soils, and there would be no runout farms. But if Nova Scotia farmers persist, as many of them have, in trying to farm without these agencies, there will certainly be run out farms—the humus will be wasted.

Chemical composition of humus.

There is no definite chemical composition of humus. It is as variable as the material from which it is derived and the conditions under which it is formed. Humus for example formed from a clover sod or from the manure of well fed stock is much richer in nitrogen (the most valuable element of plant food) than humus from a timothy sod or oat stubble or from the manure of poorly fed stock. Hilgard determined that the humus from green clover contained 8.24% Nitrogen; that from oat straw 2.50% Nitrogen and that from saw-dust 0.32% Nitrogen.

Since humus consists of vegetable remains, it naturally contains all the elements of plant food required for the growth of new plants. Besides it contains organic acids which unite with the mineral elements of the soil as well as the mineral elements of which itself is composed, such as lime, magnesia, phosphorus, and potash etc., and forms, with them, compounds to which the term humates is applied. The humates are a very available source of plant food and the larger the proportion of phosphorus, potash, lime, etc., which exist in the soil in the form of humates, the better.

Effects of Humus.

(1) Physical.—(a) It improves the tilth of the soil. Clay soils which are almost impossible of cultivation become quite friable when sufficient humus is incorporated to lighten their texture and admit air. Sandy soils, which are otherwise too light, are bound together by the presence of humus and so improved in character.

(b) It increases the moisture holding capacity of the soil. Pure humus will absorb from 100 to 200% of its dry weight of water in comparison with 10 to 15% for sandy loam and 25 to 35% for clay loam. It thus acts as a sort of reservoir for water. Fields, therefore, rich in humus will grow good crops even in dry seasons, whereas the crops on fields poor in humus, under similar conditions, might amount to almost nothing.

(c) It imparts to soils a dark color, and since dark colored objects absorb more heat than light colored objects, one can understand that a humus rich soil may frequently have a temperature of 8 or 10 degrees more than a humus poor soil. This leads to more rapid germination of seed and more rapid growth of plants.

A still more important source of heat in a soil rich in humus is that given off in the process of decomposition as a result of which the temperature of a soil rich in humus may be several degrees higher than one poor in humus. This principle is made use of in hot beds, the heat for which is supplied by the decomposing humus of the manure.

(2) Chemical.—(a) Since humus consists of the remains of former plant or animal life, it contains all the elements necessary for the growth of future plants. It is therefore a direct source of plant food.

(b) As already explained, humus contains organic acids which act upon the mineral elements of soils and render the phosphorus, potash and other mineral elements available for plants. It is therefore an indirect source of plant food.

(3) Bacteriological.—The presence of humus in soils leads to an increased number of bacteria, and it is an invariable rule that the more numerous the bacteria, the more fertile the soil. In soils poor in humus only a few thousand bacteria will be found in an ounce, whereas, in soils rich in humus, there may be anywhere from 400,000,000 to over 1,000,000,000 bacteria per ounce. These bacteria are busily engaged breaking down the complex vegetable substances into simple forms which can be used by the next generation of plants. Also, they are forming acids in the decomposition process, such as carbonic acid and other organic acids which help to make available the plant food in the mineral elements of the soil. Sometimes too much acid is produced and the soil becomes sour. Lime is nature's corrective for this condition, but that must be left for another chapter. Humus, bacteria, and lime are a triumvirate that always result in fertile farms.

How to maintain and increase the supply of Humus.

There are three practical methods by which the humus content of soils may be obtained and increased. (1) The feeding of the produce raised on the farm to stock and the application of the manure produced to the soil. (2) The plowing under of crop residues, especially clover, consequent to a rotation of crop. (3) the plowing under of green or cover crops.

Barn Yard Manure.

Barn yard manure differs from and is superior to commercial fertilizers in that it contains, besides the essential elements of plant food, humus. Incidentally, it also contains enormous numbers of those bacteria which are essential to the best results from humus. It must not be forgotten, however, that it is easily possible to lose large amounts of the humus contained in the manure heap. Three months exposure to even a mild fermentation will destroy at least 50% of the humus originally contained in the heap. Such an enormous loss cannot be afforded in this province where the humus supply is of such great importance.

The best methods by which to prevent this loss of humus are discussed elsewhere in the article on barn yard manure. Suffice to say that manure should be applied to the land as soon as practicable after it is made. If stored it should be kept in compact level heaps from which as much air as possible is shut out. Pigs and other animals that tramp over the heap, can materially assist in bringing this condition about.

It is possible to overestimate the extent to which the humus of a soil may be kept up by the application of manure made entirely from food grown on the farm as the following facts indicate. In the process of digestion, animals use to supply heat and energy about 60% of the humus material contained in the foods they consume. In the manure, therefore, even if perfectly saved, there will be but 40% of the humus material of which the fodders, upon which the animals were fed, were composed. Under careless systems of storing manure, 50% of this may be lost, leaving in the manure only 20% of the original humus material of the fodders. Whether, however, the manure be well or poorly saved, there is a large amount (from 60 to 80%) of the humus material to make up for. Extra feeds such as bran etc. bought and fed to stock will help to make up for this loss. But in general the principle source of making up for this loss must be the following of a *regular rotation of crops in which clover, and grass sod are frequently plowed under.** (See pp 44)

Plowing under of crop residues.

The residues from such crops as oats, roots, etc. are very small in comparison with the residue from a good clover crop or even from a good grass crop. If, therefore, farmers persist in the growing of either roots or grain without growing any intervening clover or grass, they will quickly deplete their soil of humus. So also, the leaving of land down to hay for a number of years without plowing will lead to a heavy loss of humus. But, if a regular rotation of crops is followed and particular reliance placed upon clover, the supply of humus can be fairly maintained. It must not be forgotten that there is practically as much organic material in the roots of a clover or grass plant as in the stem and leaves, and consequently when the half that grows above the ground is hauled into the barn there is still half in what we call the sod that may be plowed under and serve as a part of the future humus supply of the soil. This phase of the question is more fully discussed in the chapter on crop rotations. Suffice to say that on light soils or on soils in a low state of fertility a clover and grass sod should be plowed under at least once every four years and, if quick results are desired, once every three years.

The Plowing under of Green Crops.

This may be regarded as a heroic measure for the general farmer, although it is a common practice of our leading orchardists. Under a system of general farming, where stock has been regularly kept and rotation practiced, the plowing under of the crop residues is sufficient to maintain the humus supply. Occasionally, in order to destroy weeds, it may be decided to summer fallow a field. Under these conditions it is always good practice to sow about July or August such a green crop as buckwheat or if possible vetches, or clover which can be plowed under late in the fall or the next spring.

Sometimes, however, a farmer is compelled to deal with a field some distance from his buildings which is so devoid of humus that he must either haul barn yard manure a long distance to it, or must grow green crops and plow them under. This latter method has not been practiced to any great extent in Nova Scotia, and yet it is well worth the trying on many of the back pasture fields which a farmer wishes to make productive.

For this green crop method two classes of plants may be used. (1) Non-leguminous crops like buck-wheat or rye which when plowed under add vegetable matter but do not add to the store of nitrogen; and (2) leguminous crops such as clover, peas, vetches, etc. which when plowed under not only add humus but also nitrogen. Actual records show that

*NOTE.—Hopkins commenting on this (see page 199 Soil Fertility and Permanent Agriculture) 'says' " The fact is that the most important and least appreciated method of maintaining or increasing the supply of organic matter in the soil is by the use of green manures and crop residue. This is best understood by considering the following data."

Out of 100 lbs. ot dry matter in the following food stuffs	There is recovered in the manure pounds of dry matter
Pasture Grass	29
Red Clover Hay	39
Mixed Meadow Hay	39
Oat Straw	52
Oats	30
Wheat Bran	39
Corn	9

In commenting on this table Hopkins says, "In other words, a ton of clover plowed under will add nearly three times as much organic matter to the soil as can possibly be recovered in the manure if the clover is fed. In the case of oats straw about one half is digested and one half recovered in the manure while only one tenth of the dry matter of corn is found in the manure.

Comment by Writer.

Let it be clearly understood that the above figures apply only to the organic matter of humus. So far as nitrogen, phosphoric acid and potash are concerned any where from 75% to 95% depending upon the kind of animal, is recovered in the manure.

by plowing under one of these leguminous crops, not only is the supply of humus increased but the store of nitrogen has also been increased to the extent of from 50 to over 100 lbs. per acre which, at commercial rates, would be worth from $7.50 to $15.00 per acre. Wherever they will grow satisfactorily, leguminous crops are the right ones to use for the purpose. However, it usually happens that the method of growing and plowing under green crops is resorted to on fields that are too poor to produce a good growth of these leguminous crops. Under these circumstances we have found that buckwheat for a summer crop and fall rye for a winter crop are the most satisfactory plants.

A Specific Instance.

In the spring of 1908 we sowed buckwheat on a field on the College Farm which we knew would not produce a paying crop of oats or hay, and which we also knew would not grow a good leguminous crop. In order to give the buckwheat a fair chance, we put on part of the land a light application of commercial fertilizer (about 400 lbs. to the acre) and on the remaining part a small quantity of barn yard manure (5 or 6 loads to the acre being the scrapings of the barn yard). By this means we grew a very fair crop of buckwheat which we plowed under when in full bloom in the month of August. We immediately harrowed this land and got it in shape by the first week in September for fall rye. This produced a splendid crop which we plowed under the following June. We then sowed the land again to buckwheat and with it about 8 lbs. of clover seed per acre. We secured a good crop of buckwheat which we harvested and threshed, and the clover grew very well. By this treatment the land was brought into good enough shape so that it could be treated in the ordinary way.

We would strongly recommend those farmers having poor fields which they wish to bring up to a good state of fertility to experiment with even a small acreage under this system of plowing under green crops. It may seem like a whole year lost, but the alternative, frequently adopted, is to grow on these fields oats or some other crop which usually produce such small returns over and above the cost of fertilizer and labor as to result in an actual loss on the whole transaction.

Commercial Fertilizers and Humus.

Commercial fertilizers differ from barn yard manure in that they contain no humus and do not directly add humus to the soils to which they are applied. In fact they may lead to a depletion of the humus supply, as for example when commercial fertilizer is applied to a run out field that has either been in pasture or has been producing hay for a number of years, under the following conditions. The field is sown to oats or other grain but not seeded down with clover and grass seeds. The result may be a paying crop of oats, but since oats leave very little stubble behind, the humus content of the field is reduced. If the same field, when sown to oats and seeded down with clover and timothy were used as a hay field for a number of successive years, the humus would also be depleted. Sometimes farmers have followed one or other of the above practices, and having at first achieved satisfactory results, have repeated the practice with poorer results—the fields have been robbed of their humus. But if the field, having been sown to oats, and seeded down to clover and timothy, has only had one year's hay or possibly one year's hay and one year's pasture taken from it, and then been plowed, it is quite possible to have maintained the store of humus.

But commercial fertilizers can be used to increase the store of humus. If, for example, these fertilizers are used to grow cover crops to be plowed under, they will lead to a large increase in the humus supply. Such practice, however, will not often be resorted to by the general farmer. But when he uses commercial fertilizers to supplement his barn yard manure and by their agency grows bigger crops to feed to live stock and also grows more clover and plows under heavy sods frequently, he will increase the store of humus.

Humus Essential to Profitable Returns from Commercial Fertilizers.

The farmer who gets the biggest returns from money invested in fertilizers is the farmer whose fields contain the most humus. More especially is this the case when such fertilizers as bone meal, basic slag, natural rock phosphate, etc. are used. In all of these fertilizers, the phosphoric acid, their most valuable ingredient, exists in a form insoluble in water and must be changed into a soluble form before plants can make use of it. In the factory the fertilizer manufacturer accomplishes this by adding sulphuric acid. In the soil the same result can be achieved if humus acids are present. Consequently these fertilizers applied to lands poor in humus give small returns, but applied to lands rich in humus give big returns. The farmer, therefore, who uses his commercial fertilizer with barn yard manure or with plowed under green crops or heavy sods will get far better returns than the farmer who uses commercial fertilizers without these natural agencies.

Conclusion.

Humus may be maintained or even gradually increased by the following practices;—

(a) Live stock farming with its attendant use of barn yard manure.

(b) Reasonably short rotations in which clover and grass sods are plowed under at not more than 3 to 5 years intervals.

(c) The use of clover, always, when seeding down.

(d) The plowing under in extreme instances of green crops such as buckwheat, rye, clover, vetches etc.

(e) When commercial fertilizers are largely depended upon short rotations and the plowing under of green crops are absolutely necessary.

The humus supply may be depleted by the following practices:—

(a) Selling hay and other products off the farm instead of feeding to live stock.

(b) Careless preserving of barn yard manure.

(c) Growing too many successive crops of oats, etc. or roots or even hay, (the latter is the most common source of humus depletion in Nova Scotia).

(d) The wrong use of commercial fertilizers.

In a light open soil humus is rapidly decomposed and lost and consequently one must apply manure more frequently and follow a shorter rotation in order to conserve the humus supply than on heavier soils.

THE CONSERVATION OF SOIL MOISTURE.

M. Cumming.

The amount of moisture available, more than any single factor, controls the aggregate crop yields of a country. A dry year generally results in small crops and a wet year in big crops. And yet every year, from three to four times as much water falls upon the lands of Nova Scotia as is required to produce the biggest possible crop. To be exact, the average precipitation in Nova Scotia is about 40 inches in comparison with about 15 inches in Alberta and 22 inches in the country adjoining London, England. But this Nova Scotia precipitation, unlike that of England does not always occur at the time when the plants require it. In fact if one could control the rain fall, ten inches would be ample for the biggest crops that could be grown, but it so happens that the heaviest rains in this province occur for the most part in the fall and spring when vegetation is dormant. One of the big probems, which, therefore, the farmer has to solve, and which he sometimes solves unconsciously, is the conserving of the fall, winter and spring rains to supply the summer demands of crops. It is worth while studying this subject for its solution means that, no matter how dry our summers may be, we will always be sure of more than average crops.

Briefly, that kind of tillage, which keeps the surface scil in a loose open condition, enables the rainfall to enter the soil easily, and, furthermore, checks the subsequent loss by evaporation of this water.

You Must Get the Water Into the Soil Before You Can Save it.

Whenever the surface soil is tight and stiff and impenetrable, the rains never get into it thoroughly but pass off by surface drainage and are largely wasted. Every farmer should aim therefore to get his fields into that sponge like condition which will make them absorb moisture in winter as well as summer and hold it there until pumped out by the plants themselves.

Fall plowing is a help. Fall plowing and subsequent cultivation leaves little ridges and hollows which serve as tiny basins for catching and holding excesses of moisture which would otherwise drain away to the river. Especially on rolling land, the effect of leaving the furrows in a direction which will prevent the washing of melted snows and rains is very important. King (The Soil page 187) says he has observed a mean difference of not less than 6 lbs. of water to the square foot (130 tons per acre) to a depth of four feet on adjacent lands plowed in the fall as compared with those not plowed, the surface of neither having been disturbed in the spring until May 14th.

The same observations apply to early spring plowing and cultivation in comparison with deferred operations, in discussing which, we must explain an anomaly which for years bothered the writer. It is this that early spring cultivation not only helps to provide a warm dry seed bed but also conserves moisture in the soil. Of course, we do not ,mean too early cultivation. What we mean is the plowing or harrowing which is done just at the time, not before or after, when the stirred soil pulverizes and lies open and friable in comparison with the compact soil below it. After this operation, the upper surface of the soil which has been stirred dries out under the influence of the air and sun. But this light dry soil lying on top also acts as a blanket or, as it is technically called, *a mulch* which holds all the moisture which has been stored below, preventing it from evaporation. **No matter, therefore, whether it is for a crop like turnips to be put in late or a crop like oats to be put in early, get your spring plowing and harrowing done just as soon as soil conditions will allow.** And this is where fall plowing again leads to the conservation of moisture, for, if all plowing and cultivating is left until the spring, it will manifestly take much longer to get over the fields with the narrow plow than with the wide harrow which latter implement, be it a disc or a spring tooth or a spike tooth, will cover so much more land in the same length of time than the plow.

Every other factor which makes the soil get into a sponge like receptive condition, no matter under what crop it is, or what the season of the year, contributes to the amount of water which gets into instead of running over the surface of the soil.

Because they open up a soil and make it porous **underdrains help**. Here again is an anomaly in that underdrains, the function of which is to carry off water, actually conserve water. The reason is that the undrained soil becomes more open and friable and therefore absorbs more water than the soil that is not underdrained. Some of this water runs away through the drains themselves but not nearly as much as wastes away from an undrained field which has not the porosity necessary for holding capillary water and which, moreover, becomes so impervious that a large part of the water runs over the surface.

Increasing the humus supply of the soil helps. 100 lbs. of pure humus can absorb in sponge like fashion about 150 lbs. of water whereas 100 lbs. of ordinary soil can in the same way absorb only from 20 to 40 lbs. of water. Further the presence of humus opens up heavy soils and makes light soils more retentive. Hence those farming processes which lead to an increase in the amount of humus of the soil, help to conserve soil moisture. Such practices are the feeding of most of the produce grown on the farm to live stock and the subsequent application of barn yard manure, the practicing of short rotations in which clover and mixed clover sods are frequently plowed under, and, in heroic cases, the actual plowing under of green crops. These subjects are more fully discussed in the preceding article on humus.

You Must Save the Water as Soon as You Get It Into the Soil.

When the water has found its way into the soil, save it by cultivation. The principle is this; the water, which has sunk down into the depths of the soil, rises by capillary attraction from soil particle to soil particle just as oil creeps up the lamp wick; and always, until prevented by some obstacle such as a board or a stone or a dry earth mulch, it works to the surface of the soil, where it will be evaporated without having accomplished one bit towards the growing of plants which may soon suffer for lack of moisture. Cultivate therefore as often as possible so as to preserve the dry earth mulch on top and begin the work as soon as conditions permit in the spring.

King (see "The Soil" page 188) gives a forcible instance of the waste which may occur through deferred spring culticultivation. He states that on April 28th. a piece of land, that had been in corn the year before, was plowed and sowed to oats. The next day a determination of the amount of moisture in the soil down to a depth of four feet was made. Seven days later another determination of the moisture in the soil was made. Adjoining this piece of land, lay another piece, which was not plowed until May 6th. on which date a determination of the amount of moisture was made, also to a depth of four feet in order that a comparison might be instituted between the moisture content of a soil cultivated early in the spring with that of a soil on which cultivation was deferred for one week. The result was that the soil cultivated on April 28th. contained on May 6th., 198 tons of water more in the first four feet than did the adjacent soil which was not cultivated until May 6th. 198 tons of water per acre is equal to a rain fall of 1.75 inches which is more than often falls in a whole month in the summer season. The conservation of this amount of water every spring would ward off the evil effects of many a dry spell in summer and getting on the soil one week earlier did it.

Fall plowing, fall cultivation, early spring plowing and cultivation, underdraining and increasing the humus content of the soil are the more important measures which a farmer has at his disposal for conserving moisture for oats, wheat, hay and similar crops. But he has a more effective additional means of conserving moisture in his cultivated crops such as roots, potatoes, corn, etc. Briefly, by keeping the cultivator going between the rows just as frequently as is necessary to keep the upper two or three inches of soil in a fine mellow condition, will save tons of moisture. No specific directions can be given as to how often the cultivating must be done, but the general principle is that, just as soon as the surface soil has become a bit hard as, for example, after a shower of rain, it should be stirred. Sometimes this will necessitate a cultivation within a week of when the last was completed; sometimes two or three weeks may elapse between cultivations. But in any case the cultivator should be kept going just as long as a horse can get between the rows. And it must be remembered that this same cultivation is destroying weeds and thereby saving hand hoeing and is also helping to set free the stored up fertility of the soil.

This, as far as we understand it, is the essence of moisture conservation, and when one reviews the subject he finds that the processes are those which are generally recognized as the processes of good farming. In other words the good farmer is a conserver of soil moisture. The reader may stop here for in the remaining part of the article it is our intention not to add further practical points, but, for the sake of the student, to explain some of the principles upon which the practices described in the foregoing paragraphs are founded. *Therefore we are addiug just a little science.*

Water exists in the soil in three forms: gravitational, capillary, and hygroscopic water.

If you dig a hole in a fairly wet piece of ground you will observe in the bottom of it free water. Above the free water the earth is damp because of little films of water which surround each particle of soil. The free water in the bottom of the hole is gravitational water which under the force of gravity seeks lower levels in contrast with the water above it which we call film or capillary water and which travels from particle to particle downwards and sideways and upwards without any reference to the law of gravity. To get a vivid idea of this capillary water, pour some water over a heap of marbles and observe the films of water which subsequently adhere to the surface of each marble. The smaller the marbles, the more surface there will be and consequently the more capillary water; the larger the marbles, the less the surface and the less the capillary water. A clay soil will therefore hold more capillary water than a sandy soil and other things being equal stands drought much better. As a further illustration, the oil in the bowl of a lamp is like the free water; the oil which passes up through the wick is like the capillary water. Plants derive their water supply from the capillary moisture.

After all the gravity water and the capillary water of a soil have become exhausted so that the soil looks as dry as road dust, there is still left some water which the soil refuses to give up except by the application of artificial heat. This is hygroscopic water. Its agricultural value is very slight although experiments have shown that the presence of hygroscopic water in the soil retards the wilting of plants in a dry season.

Ideal conditions for growth are those in which there is a big reservoir of water somewhere below the area of root growth and as much capacity for capillary water as possible above that. It is surprising how much of this capillary water certain soils are capable of holding.

A cubic foot of average soil weighs when dry about 100 lbs. It has been ascertained that:

100 lbs.	of pure	sand	will hold about	22 lbs.	capillary water
100	"	clay	"	55	"
100	"	humus	"	143	"
100	"	loam	" from	28 to 40	"

From a consideration of these figures it is easy to understand how a sandy soil becomes dry early in the summer and under ordinary conditions will produce poor crops in a dry season. A clay soil on the other hand will hold its water so tenaciously that it will not become dry for a long time. But, unfortunately, it may then become so dry as to cake after which rain, falling upon it, will run off instead of into the soil. Plants, therefore, may in a dry summer suffer just as much from lack of moisture in a clay as in a sandy soil. A mixture of the two, clay and sand, commonly called loam, provides the best conditions. But, of course, except in small plots it is not practical to add clay to sand or sand to clay. Naturally, therefore, if a man can have his choice of a farm, he will pick the one with the loam soil and if possible the heavier types of loam.

Assuming, however, that a man owns a sandy farm it follows that he must carry on a class of farming which will add humus to his soil for humus will greatly improve the capillarity or water holding power of his sand. If he has a clay, he will also try to add humus, for it will lighten up the clay and prevent the formation of that hard impervious surface which is so undesirable. In a clay, drains will further help to make the soils friable and so, as already explained, improve the moisture conserving qualities. Humus also is necessary to bring about the best conditions in a loam but it is not so essential in a loam as in a clayey or sandy soil. The methods of getting humus into a soil have been referred to previously in this article and have been more fully discussed in the preceding article on humus and soil fertility.

Tillage in the broadest sense of the term combined with the addition of humus will solve the moisture problem on the farms of Nova Scotia and will ensure crops far above the average in the driest season that has yet been experienced by the farmers of Nova Scotia.

A Few Questions and Answers.

What is the minimum amount of moisture precipitation with which crops can be grown?

Ans. At dry farming Congresses held in Canada and the United States, different farmers have told of their successful growing of from 20 to 30 bushels of wheat and like quantities of other crops in a year when the total rain fall was only 6 inches in comparison with about 40 in Nova Scotia. Perhaps the following figures will help to explain the possibility of growing crops with such a small rain fall;

King (The Soil Page 155) states that

To produce 1 ton dry matter in R. Clover requires 452.8 tons water = 4.03 in. rainfall.

To produce 1 ton dry matter in oats requires 522.4 tons water = 4.76 in. rainfall.

To produce 1 ton dry matter in potatoes requires 422.7 tons water = 3.73 in. rainfall.

To produce 1 ton dry matter in Flint Corn requires 233.9 tons water = 2.14 in. rainfall.

To produce 1 ton dry matter in average crops requires 325 tons water = 3 in. rainfall.

Figuring this out in the case of a 300 bushel crop of potatoes which would weigh 300 x 60 equals 18,000 lbs. of which 20% is dry matter, we find that such a crop contains 3600 lbs. dry matter and according to the above table

1 ton = 2,000 lbs. dry matter in potatoes requires 3.73 in. water.

3600 lbs. dry matter in potatoes requires 6.71 in. water.

This means that, if we could conserve it 6.71 inches of rain would supply all the moisture required for a 300 bushel crop of potatoes. In the same way we could point out that from 5 to 8 inches of rain fall, if it could be conserved, would supply the demands of the biggest crops of all kinds commonly grown on our farms. And yet the average rain fall in Nova Scotia is about 40 inches per year. The question naturally occurs, therefore, what happens the surplus 30 inches and why do our crops ever suffer from drought? The answer is that a large quantity drains away overthe surface, considerable drains away either in the sub-soil or in artificial underdrains and altogether too much is allowed to evaporate. If the practices recommended in the foregoing article of getting the soil into good friable condition by means of adding humus, by underdrains, and by frequent cultivation is followed, there should never be a shortage in the moisture supply for plants. In corroboration of this, we need only state that many farmers in the province grow big crops even in years when droughts of several weeks in succession have occurred.

Ques. What is dry farming?

Ans. Dry farming is the kind of farming that has to be practiced if good crops are to be grown without the use of irrigation in countries where there is a small precipitation of rain. The process is an application of the principles described in the foregoing article carried to a greater extent than is required in this country i. e. frequent cultivations to keep the soil in as mellow a condition as possible throughout the year. Frequently the dry farmer has to begin conserving moisture a full year before he sows his seed. He keeps his field in bare fallow giving it frequent cultivations through the whole season so that it may store up and conserve all the moisture that falls on it during that year. He begins cultivation as early as possible next spring and puts in his crop just as soon as he can. If it is a hoed crop, he keeps his cultivator going as frequently as he can during the season. If it is a cereal or grass crop he depends upon his previous operations and the early growth of the plants to shade the ground as the principle means of saving moisture.

Ques. How often should a farmer till the soil when growing potatoes, turnips, garden truck and the like?

Ans. Cultivate just as often as the slightest crust forms on the surface soil. This may mean for a time once every ten days and it may mean only once every three or four weeks. Everything depends on the weather.

Ques. Can the soil be cultivated too often?

Ans. It is not likely to be, but a clayey soil can be tilled so often when dry that the particles will become almost like dust. In such a case rain may cause extreme puddling and the formation of hard clods that are difficult to break down. Such a case will not often occur.

Ques. Does it pay to water plants in a garden?

Ans. It will often pay but when the watering is not followed at intervals by hoeing or cultivating to break up the surface soil into a mulch, a great deal of labor will be wasted for the pouring on of water helps to compact the surface soil and so creates conditions favorable for evaporation. The use of the hoe or the cultivator as already explained will stop this.

UNDERDRAINAGE.

By B. H. Landells.

The value and importance of land drainage in farm economy and practice cannot be appreciated fully until one has learned something of the enormous supply of plant food which is to be found in even our most unproductive soils, only waiting to be set free by the art of the agriculturist. One must realize also what the soil moisture supply means as a carrier of this food to and into the roots of the plant and what this moisture supply means to the bacterial and chemical actions in soil which tend to make plant food available. Further one must know how to appreciate the importance of good physical condition of the soil and the value of air circulation and of heat in the soil and how moisture affects these. Finally one must realize how all these react the one upon the other with the result that the soil steadily improves or continually goes backward in fertility.

It is unnecessary, for the purposes of this article to go further into that phase of the subject, except to point out that drainage forms the most effective means, at the command of the farmer, of controlling the moisture supply of the soil. Indeed it is about the only means, for all his other moisture control operations depend upon having the land made fit for tillage implements first of all and the earlier in the spring this is done the more effective it becomes.

Will it Pay.

There are few farmers in the Maritime Provinces who do not realize that better drainage means better crops and that, about on every farm or in some fields on every farm, better drainage is necessary if best results are to be obtained. In many cases it is necessary, if crops are to be produced at a profit at all. In spite of this realization, the question for each farmer, "Will it pay *me* to underdrain *my* farm?", must be studied and answered in each individual case. It will not always pay and the question can only be answered by a very careful comparison of likely cost and return in each case. It is in making this comparison that a knowledge of the principles of soil fertility, already mentioned, will aid materially. No operation in soil improvement is as costly as drainage. It will not pay to drain and let the land lie comparatively idle. It must earn more than before; for the expense of drainage must be made up. One thing is certain; it will not pay to underdrain unless one is prepared to handle the farm in such a way that farming itself pays, which is by no means always the case. Underdrainage will not till the soil though it will put the soil in condition to be tilled earlier, better and easier. It will not kill weeds although it gives the farmer a longer season and puts the soil in a better condition for the cultivator and hoe. It will not harvest the crop, but it will insure a heavier crop and an earlier crop with a chance for better harvest weather. It will not market the produce but since earliness is a factor in prices, it helps even in that.

How Much Per Acre.

Assuming that the farmer has decided that drainage would be profitable and that he will give the farm fair treatment afterwards, his next problem is to decide how much expense is warranted under his particular condition. He may be so situated that his land, when well drained, will produce very valuable crops but when only fairly well drained these crops will not do well and cheaper ones must be substituted. On the other hand he may grow only crops which do not demand thorough drainage or which are not high priced and bring smaller returns per acre. It is obvious that the one condition will warrant a more thorough and more expensive drainage system than the other. He may decide that his farm would pay for $30.00 per acre expended in drainage, but would not pay for $50.00 per acre while $20.00 per acre would not effect appreciable improvement under the conditions obtainable. He must see to it that he does not expend his $30.00 per acre or even a larger sum and only get $20.00 worth of work done or that his $30.00 worth does not cost him $50.00 through mismanagement. There is a great danger that such may be the case when inexperienced men only are available. The *man* is a very important factor in this work.

The following are some of the factors affecting the cost of drainage; the "lay" of the land, type of soil and subsoil and source of water supply all affect the direction, distance apart, and depth of drains, and consequently the total length of drains put in. This will be discussed further in this article. Kind of soil also affects cost of digging. Clay soil will not dig as cheaply as sandy soil, stony soils are most difficult, therefore most expensive. Rates of wages in the particular locality, as well as the skill of the workmen, are also factors. The price of drainage material, and distance this has to be freighted and hauled, may markedly affect the cost of each foot of drain.

Under Drains Better than Open Drains.

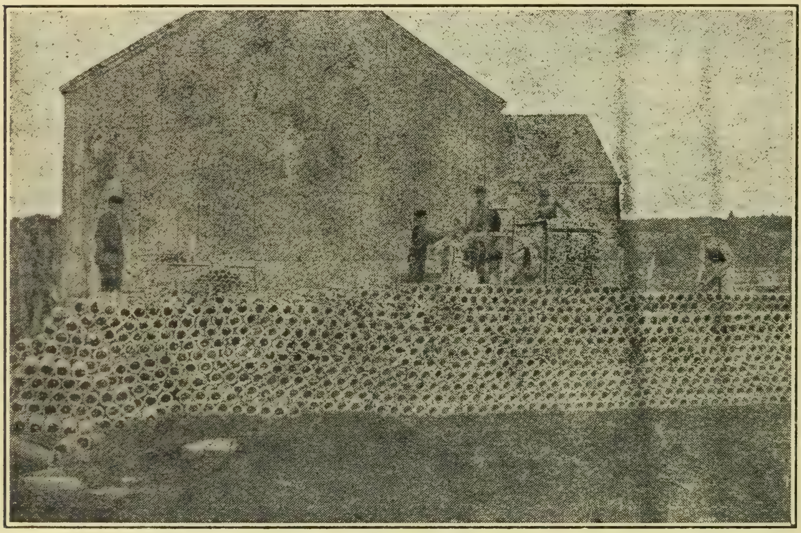
Since the opening of the ditches is the most expensive part of the operation, it pays better to use the under drain than the open drain except where a very large amount of water is to be carried. The labor of keeping open ditches cleaned out will cost far more in a few years than the cost of tile or other material to put in them. Again, a ditch will only drain to its full depth for a short time after each cleaning. For the same purpose of saving labor it is wise to use drainage material which will be most permanent. If a wooden box will rot out in fifteen years, the cost of keeping a field drained with wooden boxes for thirty years will be twice the first cost of the drainage, while if the tile had been used at first, the cost, though possibly 5 to 10% greater in extreme cases, would be borne once only as the drains would be permanent. Stones will not rot but are apt to allow a great deal of earth to wash into the drain and clog it in a short time. A wide ditch is required for a stone drain and the extra cost of this will often offset the cheapness of the stones themselves. Where stones must be disposed of, make drains of them; otherwise a stone drain is not economical.

Tile the Best to Use.

Drainage tile are recognized today as the best available material. The drains are permanent if the tile are well made and well laid. Ditches may be made narrow; so only a small amount of earth need be removed. The only objection is the first cost of material. Clay tile have been in use for many years, and, when properly made and burned, will fill every requirement. They should be as hard as possible, giving a clear ring when struck with hammer or stone. It is impossible to get them too hard if they have not warped or twisted with the heat.

Concrete Tile.

Concrete tile have been in use only a few years butthey appear to be equal, in every respect to the clay tile. Recent experiments seem to indicate that they will withstand the combined action of water and frost rather better than clay. This is doubtless due to the fact that the range in size of the gravel, sand and cement, leaves less space between particles. Less water can be soaked up into the wall with the tile, so less expansion will take place when the frost touches the tile. To reduce danger from frost injury, the material, forming the wall of the tile, must be packed solidly. It is here that the weakness of careless manipulation of the machines, the hand machines, particularly, shows itself. Good tile can be made with the hand machine, but as we find them, they are not all good. The power driven machine exerts more pressure than the others and the operator is usually more skilled and more careful. As a result, these power made tile are usually much better than



MAKING CONCRETF TILE WITH PORTABLE OUTFIT.

the output of the hand machine. The cost of making conconcrete tile varies largely, the chief reason being, as is the case with clay, it can be made much more cheaply on a large than on a small scale. The cost appears to be about the same as for clay and, since no kilns for burning are needed, it is possible to move concrete tile machinery nearer the consumer, and to make the tile in smaller centres. With the object of testing these tile under all conditions and proving the economy of their manufacture, the drainage Department of the Agricultural College, purchased in 1914 one of the smaller types of power driven machines and had it mounted on trucks so as to be easily moved to any desired point. This machine has demonstrated that concrete tile can be made, at points removed from the railways much cheaper than the clay tile can be bought and shipped, but made in small lots, the cost runs slightly above the purchase price of clay tile at the manufacturing points. It has also demonstrated that concrete tile, under Nova Scotia conditions, can be made satisfactorily. There are many points, in Nova Scotia, where these tile can be used much more economically than the clay but for places within easy reach of the clay works it is not expected that they will be used.

How to Dig Ditches.

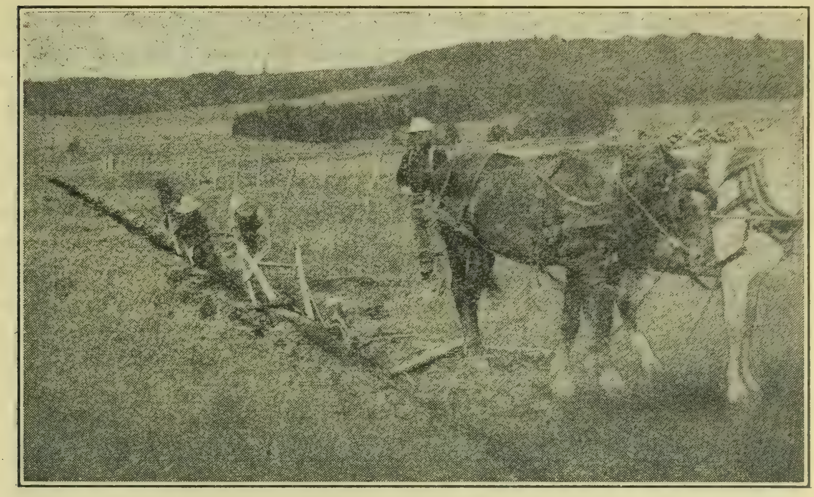
As stated before, digging the ditches, is the most expensive part of drainage operations. There is room for a great deal of economy in the methods of doing the work. A few hints only are possible here.

1st. Open narrow ditches. Do not move more earth than necessary. 14 inches wide at the top, 7 or 8 inches at the bottom is sufficient width for ditches of 3 to 3½ feet in depth where the work is done by hand.

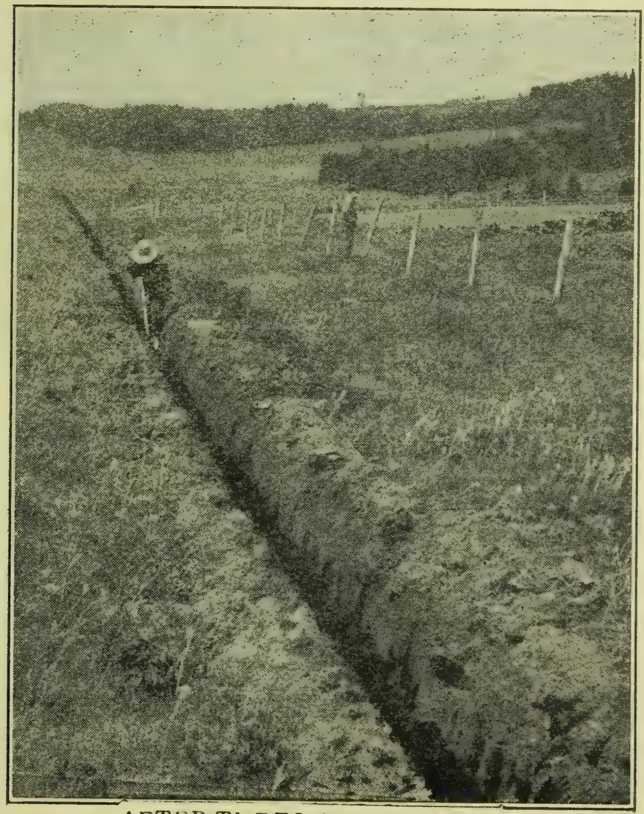
2nd. Wherever possible, the plow should be used to open the first furrow in depth and, unless the land is easily spaded it is wise to plow deeper. The plow makes a wider ditch than is necessary, but even then 18 to 20 inches at the top is wide enough. Plow outward from the centre of the ditch at first throwing a furrow outward each way and do not move the turned sod at all. If plowing deeper, turn the earth towards the centre of the ditch and throw out each furrow as turned. Be careful to keep well inside the turned out sod with these last furrows. This second furrow should not be plowed if the earth will stay evenly for the plow merely loosens the earth and since a narrower ditch can be dug by hand it is unwise to stir up more earth with the plow. If the plow is a narrow one, it can be used deeper still, but it will be necessary, for deep work, to use a sub-soil or ditching plow, either a special plow or a home made implement. A very good plow can be made by taking the mould board off an ordinary, worn out plow. The proper use of the plow will cheapen the digging a great deal, particularly at the surface and when the soil is hard. It is necessary to make an evener 8 feet in order to put a horse on each side of the ditch and to use a long chain on the plow. Fasten this around the beam but not to the clevis.

TURNING SECOND FURROW IN OPENING OF DITCH

3rd. Do not throw the first earth removed far from the ditch; pack it close to the edge. It must be put back and the farther it must be moved the greater the cost; for the same reason throw the earth on both sides of the ditch. The plow or other filling in implement will work up on one side and back on the other. As the ditch is deepened the earth thrown just over the crest, thus formed close to the edge, will roll away on the opposite slope. If this crest had been formed five or six feet away at first each



FIRST SHOVELLING AFTER TURNING THIRD FURROW

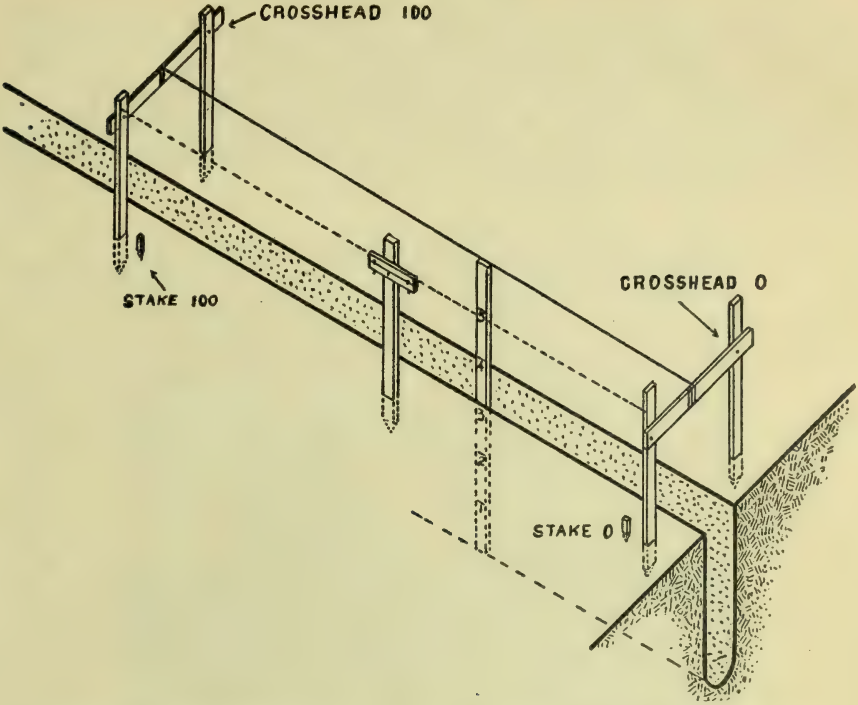


AFTER THE FOURTH FURROW

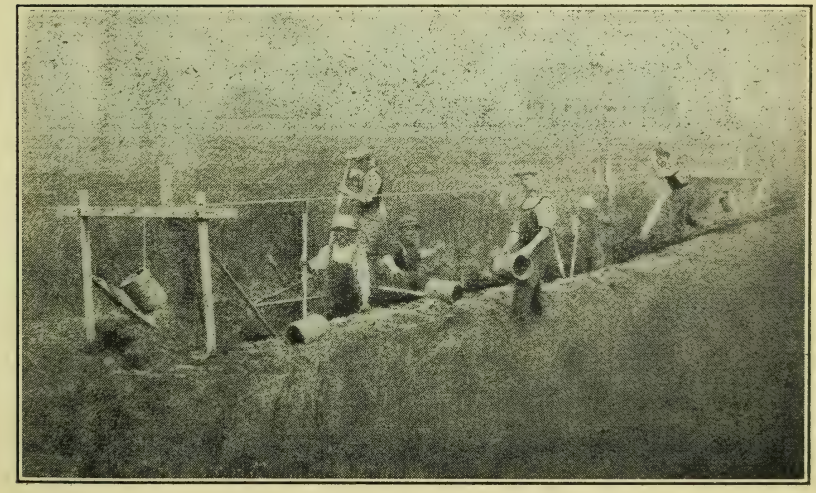
shovel full of earth will land on the nearer slope and much of it will roll back into the ditch. If the sod and the top soil is saved apart to pack down over the tile, it will aid in preventing quick sand washing in, or, in clay, will form a porous layer and help to start the drain working quickly.

The bottom of the ditch need be only wide enough to lay the tile, but if ordinary spades and pointed shovels are used, it is economy to make it just wide enough to clear the edge of the shovel. Grade the bottom of the ditch carefully. The tile must have a firm, properly graded floor to rest on so they will not be broken when the pressure of earth above comes on them. There must be no soft places or hollows in the drain bottom to hold water which will expand on freezing and destroy the tile. Every part of the drain must have some grade to allow all water to drain out. To insure this, where the ground is comparatively level, drive a stake on either side of the ditch and nail a board across these about seven feet above the point where the ditch bottom is to be. Repeat this at a point 100 feet along the ditch, nailing the second board as much above or below the level of the first as the fall in the bottom of the ditch is to be. Stretch a line over these boards and use a light pole 7 feet long to test each part of the bottom of the drain. When the pole just slips under the line the ditch has a right depth at that point and one can grade it properly by testing it along its course. This is a simple method of getting a grade and following it.

PLOW FOR DITCHING PURPOSES FITTED WITH LONG EVENER

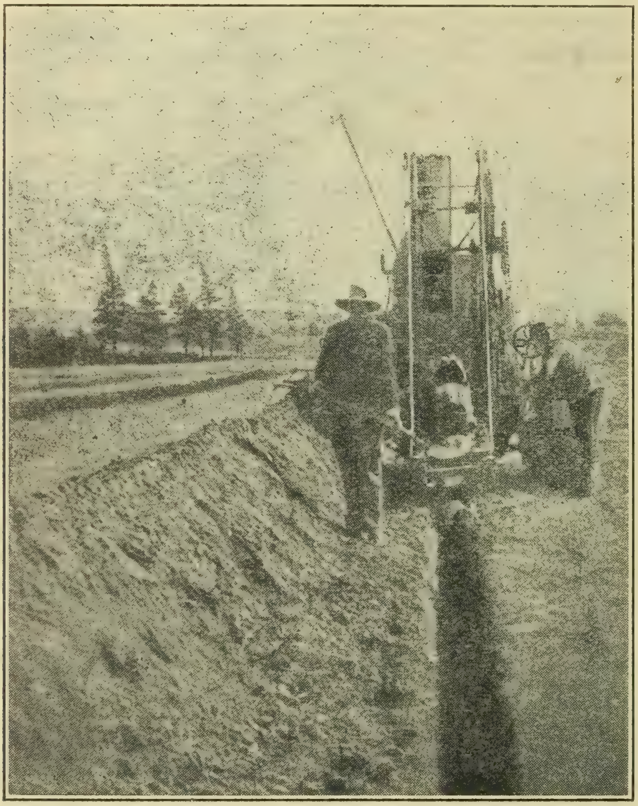


USE OF HOMEMADE LEVEL IN SETTING "OVERHEAD LINE."



USE OF OVERHEAD LINE IN GRADING THE DITCH BOTTOM

When laying the tile one should discard all soft or cracked ones and make close joints between tile. In soft spots a board under the tile is useful to give a firm floor. Throw in enough earth, when laying the tile, to pack them solidly and cover them so stones rolling in cannot break them. The ditch can then be filled with a plow or scraper cheaper and quicker than by hand.



3 FT. PER MIN. 5 FT. DEEP.

The Power Ditching Machine.

For extensive operation, where land is not stony, the "Ditching Machine" is economical. It has the added advantage of doing a large amount of work in a short time so as to complete it between seasons. It is a mistake, however, to suppose that all drainage can be economically done with this machine. As a matter of fact, for our ordinary small ditching jobs, the machine costs too much to move to the farm to be economical.

How Far Apart.

As already mentioned, the number of feet of drain put in any particular field, may vary according to conditions and this, of course greatly affects the cost. These conditions, slopes, nature of soil and subsoil, source of water supply, value of land, etc. are never twice the same but all come under certain general classes.

In its affect upon drainage operations sub-soil may be classed as clay, sand (grading from quick sand to gravel) and muck.

Clay soil is very resistant to percolation of water; so each drain will affect only a comparatively narrow strip of land, where the land is level and water comes in from both sides of the drain. The opposite is true of sandy and mucky soils. These drain very easily and for long distances. They differ mainly in that fine sand (quick sand) will wash into every crack and crevice in the tile line in such quantities that it is hard to keep the tile from clogging until the ground settles, and extra precautions are often necessary to prevent this. Muck, on the other hand, being fibrous does not tend to clog the tile at all, but being of vegetable origin it begins to decay and settle as soon as the water is removed so the drains must be very deep at first or they will be too shallow in a few years.

Sources of water supply may be classed under three heads:—

Springs.

Ooze water in a hillside.

Average water table too near the surface in comparatively flat ground.

In the first case, each spring may be drained independently by the shortest route to the outlet.

For flat ground, plan the most economical system of drains possible which will bring every part of the field within a certain distance from the drain. This distance is to be determined partly by the nature of the subsoil both because sandy soil will drain farther than clay and because the deeper the drains the farther apart they may be. Yet if the deepest foot is extra hard to dig it may be better to put in shallower drains and more of them. The distance apart will also be partly determined by the expense justified as pointed out before.

On an average, 3 to 3½ feet in depth with a distance apart of from 35 to 45 feet in clay up to 60 or 70 feet in lighter soil will be most practical for ordinary crops. For more intensive crops, such as garden truck, the drains should be placed considerably closer together.

For ooze water the remedy is not so apparent. This water comes from higher ground somewhere near. It may be soaking over a layer of clay, between successive layers of clay or through a sandy or gravelly sub-soil in all directions and depths. If the first is the case, drain across the hillside deeply enough to make a trough in the clay stratum over which the water is soaking. Very few drains will suffice to cut off the supply of water from a large area.

If the sub soil consists of successive layers of clay with sand or gravel between the out crop of each layer will usually be marked by the upper edge of a wet streak running across or aslant the hill. A drain at the upper edge of each of these wet places will cut off the water carried by each layer. The number must be determined by the number of layers.

If the sub soil is sandy, the water will not follow the course of the drains when these are laid across the hill. Since there is so little resistance to its passage through the soil, t soaks right on down over and through the drain and still keeps the land wet below. The drains must be turned up and down the hill in order to get more grade. This means that the cut off feature is lost. Sandy soil, in such a case, will require drains placed closer together than clay soil.

Too much stress cannot be laid on the importance of a careful study of these conditions in order to put in all drains in accordance with a pre--arranged plan for the whole field or farm. This will be found far more economical than to scatter grains promiscuously over the area. The plan will be very useful later to locate drains for the removal of obstructions or for any other purpose.

The Drainage Department of the Agricultural College, offer to the farmers of the province the services of a surveyor who will visit any farm, study conditions and make such a plan as proposed. This offer is being taken advantage of quite largely but there are still many sections of the province to be visited where drainage is badly needed, and many farms untouched. Information on this work will be gladly furnished to any one who will send a card to the Agricultural College.

In conclusion, I would say that in this article I have endeavored to touch on those points which appear to be least understood or most in need of attention in our province in connection with this very important subject. The subject is treated more in detail in bulletin No. 7 on "Drainage" which will be sent free on application to the Agricultural College.

FARM YARD MANURE

M. Cumming.

Farm yard manure consists of the solid and liquid excrements of farm animals mixed with straw, sawdust, and such other substances as have been used for bedding or absorbents. It varies greatly in value depending upon (1) the kind of animal, (2) the age of animal, (3) the kind of food fed, (4) the sort of litter used, and (5) the care taken in preservation.

Value of Farm Yard Manure.

Farm yard manure is valued (1) for the plant food it contains (2) for its humus which improves the physical texture of the soil and also heats the soil (3) for the bacteria it carries to the soil, and the favorable conditions it produces for their growth. It is in the second and third points that the superiority of farm yard manure over commercial fertilizers consists.

Farm yard manure contains all the substances necessary for plant growth, i. e., nitrogen, phosphorus, potassium, sodium, calcium, magnesium, iron, aluminum, sulphur, silicon, chlorine, carbon and hydrogen. Since, however, all of these elements but the first three are usually present in the soil in ample quantities, it is customary to value manure, like commercial fertilizers, for the amount of nitrogen, phosphoric acid, and potash it contains. While this varies largely, depending upon conditions mentioned in the foregoing, a very fair average amount of these substances contained in a ton of mixed farm yard manure is 10 lbs. Nitrogen, 6 2-3 lbs. Phosphoric Acid, and 10 lbs. Potash. (A cord of manure weighs about 3 tons). These are the substances which we pay for in commercial fertilizers, and it is not therefore difficult to put a commercial value upon them.

For Nitrogen, as we buy it in sodium nitrate, sulphate of ammonia, tankage, blood meal, etc. we pay from 15 to 20c per pound, or on an average about 17c.

For Phosphoric Acid, which we buy in bone meal, basic slag, acid phosphate, etc. we pay from 4½ to 7c per pound or on an average about 6c.

For Potash which we buy in wood ashes, muriate of potash, sulphate of potash, kainite, etc.., we pay from 4 to 6c per pound, or on an average of about 5c.

On a basis of these prices we attach a monetary value to the plant food contained in a ton of average farm yard manure as follows:

10 lbs. Nitrogen at 17c per pound......	$1.70
6⅔ lbs. Phosphoric Acid at 6c pound...	.40
10 lbs. Potash at 5c per pound........	.50
	———$2.60

Of course, the fertilizer dealer may object to the above valuation on the score that the nitrogen, etc., of barn yard manure is not as quickly available as these ingredients in commercial fertilizer. We admit the objection, but, to offset it, we restate that, in addition to its value for the plant food it contains, barnyard manure is valuable on account of its humus and bacterial life. In the second last paragraph of this article on the "Lasting Effect of Barnyard Manure," the value of manure as determined by actual field trials is presented showing that the figures given in this paragraph are within the mark.

Value of the Liquid and Solid Excrement.

A mature cow, well fed, will produce from 60 to 100 lbs. of excrement daily depending on the weight of the animal. Of this from 20 to 30 lbs. is likely to be urine, i. e. about one third. Similarly a horse, will produce from 45 to 55 lbs. of excrement per day of which from 12 to 15 lbs. is urine. Sheep manure is dryer than that from the horse and swine manure somewhat dryer than that from the cow. On the average, however, about one third of the average farm yard manure consists of urine.

Urine, is much richer in plant food than the solid excrement as is shown in the following table:—

	Nitrogen	Phosphoric Acid.	Potash	Value per Ton.
The urine contains of the total amount of plant food in the manure heap....................	⅔	none	⅘	$1.53
The solid excrement of the manure heap contains................	⅓	all	⅕	1.07

Total..........$2.60

It will thus be seen that, although the urine only represents one third of the total weight of the manure, **yet it contains ⅔ of the total value of the plant food.**

In addition it must be remembered that one half or more ofthe solid excrement consists of water so that the total amount of liquid in the manure heap, all of which may be leached away, is $\frac{3}{4}$ of its total weight as is shown by Hopkins who (see "Soil Fertility & Permanent Agriculture" P. 543) states that one ton of average fresh mixed barn yard manure contains the following amounts of ingredients.

Water	Nitrogen	Phosphoric Acid	Potash	
1500	9.5	4.3	9.16 lbs.	(unexposed)
1498	10.4	6.6	10 "	(exposed)

Dangers of loss from Leaching.

When it is considered that $\frac{3}{4}$ of the average manure heap is liquid, and that $\frac{3}{4}$ of all the plant food is contained in the urine alone, we can understand the enormous loss that occurs in stables where the floors are not tight, or in manure heaps exposed under the eaves of barns. Fortunately, this source of loss is being largely guarded against in these days when cement floors, and the use of straw, and other kinds of bedding is so generally adopted. Suffice it to say that few farm investments will pay higher interest than the money spent in these cement floors and in the money or labor spent in securing some kind of absorbents. But there is another source of loss that is even more serious than leaching viz:

Loss from Fermentation or Heating.

Fermentation, which results in large losses of organic matter and nitrogen begins in manure almost immediately after it is made, as one may detect from the strong ammonia smell of a horse stable early in the morning. From that time, the fermentation process may go on until nearly 60% of the nitrogen and 60% of the organic matter passes off into the air and is lost to the farm on which it was produced. At Cornell Agricultural College 10,000 lbs. of manure containing 47 lbs. of Nitrogen was left on April 25 in a compact heap. On the following Sept. 22nd. the heap weighed 5,125 lbs, and contained 28 lbs. of nitrogen. The balance had passed off into the air. Similar experiments have been frequently tried, and in cases the losses have reached as high as 50 to 60% of these ingredients.

Causes of Fermentation and its Prevention.

The subject of fermentation in the manure heap and the soil has been carefully studied, and it has been found to be caused by bacteria which require proper proportions of heat, air, and moisture to do their most effective work. If we can shut out the air, or keep down the temperature we can largely control their work, and these are the most practical measures open to the farmer. Briefly we can keep out the air by having the manure heap levelled off and tramped down as thoroughly as possible every day. Covering the heap with earth or dry muck, or anything that will keep out air will add to the effectiveness of the method. No better agency than pigs to tramp down a heap is available to the average farmer. Sometimes, when the manure is stored in cellars, the addition of water which lowers the temperature and shuts out the air has to be resorted to, but, if the heap is kept compacted this extreme measure should never have to be used.

Horse manure being somewhat lighter in texture is more liable to fermentation than cow manure, and there are corresponding differences in the other kinds of manure made on the farm. It therefore pays to have all kinds of manure well mixed together. One of the best means of doing this is to wheel the horse manure into the gutters behind the cows each day. This may seem unnecessary labor, but the farmer, who does it, will be well repaid in the extra value of his manure heap.

Use of Chemicals to Prevent Loss from Fermentation.

Land plaster or gypsum, kainite, ground phosphate rock, acid phosphate, sulphate of magnesia, etc. have all been recommended either to prevent fermentation, or to absorb the ammonia which would otherwise be wasted. Gypsum is perhaps the most frequently used. At the same time it must be remembered that the ordinary small dusting of this substance is of little value. If it can be bought cheaply enough so that it can be used in fairly large quantities, it will prove fairly valuable. Kainite and the different phosphates are fairly useful and have the added value of being direct fertilizers. Careful experiments have, however, shown that, at best, these chemical absorbents are only fairly satisfactory. There is nothing better than dry earth especially if it contains considerable humus. For this purpose well dried swamp muck is extremely valuable and should be used whenever it is available.

Impossibility of Preventing Some Loss in the Heap Even by Best Methods.

At Woburn, England, in 1899, and two succeeding years, manure was kept under the feet of cattle in box stalls having cemented sides and a cemented bottom. By means of litter all liquid was absorbed and no loss from drainage occurred. Nevertheless, in the course of three months, a 15% loss of nitrogen occurred. Maercker, in Germany, carried on a similar experiment to compare the results from manure removed daily and kept partly under cover, and partly in an open yard. At the end of five months the compacted manure from under the animal's feet showed a loss of about 13% nitrogen, that in the covered heap, a loss of 36.9% nitrogen and that in the open heap a loss of 37.4% nitrogen. At Pennsylvania a similar experiment showed a loss of 5.73% nitrogen in the compacted manure in stalls with cemented floors in comparison with a loss of 34.12% nitrogen from untramped manure.

In view of these facts, it is evident that, even under model conditions a very considerable loss is bound to occur in stored manure, a loss, however, which may be increased several fold when the manure is loosely kept either under cover or out of doors. It is clear that the building of a manure pit or cellar does not solve the whole manure problem.

Get Manure on the Land as Soon as Possible.

The same kind of fermentation which occurs in the heap, occurs in the field after the manure is incorporated with the soil, but the difference is that soil holds nearly all the ingredients that would be lost from the manure heap. Therefore the ideal treatment of manure when used for general farm purposes is to get it on the land just as soon as possible after it is made. During the early spring and the fall, it is possible in Nova Scotia to do this and get the manure incorporated with the soil, but the wisdom of applying manure to the land during the winter months when it must lie on the surface is doubtful. Unfortunately the frequent rains and thawings of winter carry off in surface drainage much of the fertilizing ingredients. Wherever the land is level and little surface drainage occurs, we would not hesitate to recommend spreading manure in winter just as is done in Ontario, but such conditions are infrequent in Nova Scotia, and therefore the average farmer is compelled to follow some such practice as that which we follow on the College Farm. In this connection it should be noted that whatever part of the manure soaks into the soil is not wasted. It is only that which drains over the surface that is lost.

Method Used on College Farm.

The ideal kept in mind on the College Farm is to apply manure to the land as soon as possible after it is made, but, as during the summer, there are no crops to which we apply manure and, as during the winter, there is too much surface washing to justify broad casting, we keep most of our manure in a compact level heap in a cement manure cellar, from which we haul from time to time. In the Fall, that which is hauled out is immediately spread and shallowly worked in. During the winter, when work is slack, we try to haul, out all the manure that is made and build it in compact oblong heaps out in the fields, We build up several of these heaps at a time, and never apply more than a few loads to each at any one time, so that the freshly added manure may become frozen and fermentation prevented. We build these heaps from four to five feet high, as square and level as possible, and, in order to compact them, drive the teams on top. From these heaps the manure is spread in the Spring.

Small Heaps Versus Big Heaps.

Some farmers modify this practice by dumping the manure in small heaps over the field. This interferes with early spring cultivation and results in uneven crops, and is likely to be more wasteful since heavy rains, that would be soaked up by a large manure heap, are likely to wash right through a small heap and so carry altogether too much plant food into those spots in the field where the heaps are placed.

Fresh Versus Rotted Manure.

The underlying principle of the practice in use on the College farm, and which we recommend to every farmer is that *the soil is the best store house for manure.* Incidentally it has been proved, by careful experiments, at the Central Experimental Farm, Ottawa, that weight for weight fresh manure has given crop yields almost equal to those from rotted manure. And yet, as already shown, it takes nearly two tons of fresh manure to make one ton of rotted manure. The tremendous importance, therefore, of taking every measure to prevent fermentation in the manure crop, and until the manure is incorporated with the soil must be apparent to every one. The only exception which may be allowed is in the case of garden crops, a somewhat better quality of which may be grown from rotted than from fresh manure.

Rate of Application.

The heavier the application of manure, the bigger the crop. It often has been proved however, that relatively small applications of manure, at as frequent intervals as possible, will give bigger and more profitable returns per farm than large applications at long intervals. Ten or fifteen tons every fourth year will give bigger profits than 30 or 40 tons every six or eight years. Moreover if commercial fertilizer is to be used, it is better policy to use it along with manure than to use the manure on one field, and the fertilizer on another field; Each helps to supplement the other.

Method of Application.

The use of manure spreaders has rapidly increased during recent years. Their champions claim the saving of labor and the more even and fine distribution of the manure. Their opponents point out the capital invested in proportion to work done and the some times too heavy draft. It is significant that they are coming into use to a greater extent each year, and that for the most part their users are their strongest advocates. An additional strong argument in their favor is that since it pays to apply manure for general farm crops in as fresh a condition as possible, the spreader becomes a very valuable implement in that it will distribute even fresh strawy manure fairly evenly. For light top dressing, manure spreaders are almost indispensible for one can apply with them a thin even coating of manure such as could not be spread by hand.

Manure spreaders are expensive, and therefore, when only a small amount of manure is to be distributed, it is hard to justify the investment. On big farms, a single manure spreader will not economise very much labor unless the manure has been hauled out to the field during the winter time as in the College Farm practice. Where two men are working and the manure is being hauled from the pit it will often pay to have two spreaders leaving one to be loaded in the pit while the other is being hauled to the field and changing the horses to the newly loaded machine on their return. An objection raised by some to the manure spreader is that it will not spread enough manure per acre. This is a valid objection when farmers are trying to grow big crops on poor lands. There is no reason, however, why the spreader cannot go over the same piece of ground twice.

Crops to which to Apply Manure.

To get the best returns, manure should be applied to the best paying crop. If, for example, manure is applied to the potato or turnip or any hoed crop it will usually pay well for itself in the one crop and will, the next year, produce as much grain and give as good a catch of hay as if it had been applied directly to the grain crop. To a lesser extent it will pay, on lands that are in poor condition and do not hold manure well, to lightly top dress a hay crop.

Lasting Effects of Barn Yard Manure.

In no respect is the superiority of barn yard manure over commercial fertilizer so apparent as in its lasting effect. We have, for example applied from 20 to 30 tons of barn yard manure to a field of turnips and with this amount of manure have grown a crop that has paid us a profit, for feeding purposes alone, of $25.00 to $30.00 per acre when, without the barn yard manure, the crop would scarcely have paid for the labor spent upon it. Then we have reaped 15 bushels more of oats in the succeeding year over and above that which we would have reaped had no manure been applied; and then we have cut two or more crops of hay averaging one to one and a half tons more per acre than on unmanured land. And the striking point of it all is that by sticking to this practice for a few years we have not only harvested larger crops, but we have brought our fields into a more productive state than when we began. Incidentally the illustration serves to show that the valuation put upon barnyard manure of $2.60 per ton is not one bit too high. The historic illustration of this lasting effect of barnyard manure is the famous wheat field experiment carried on at Rothanstead, England, where it was shown that during the period from 20 to 25 years after the application of manure to a field had ceased, the yield of wheat on that field was 24 1-8 bushels annually in comparison with 11½ bushels per acre on an adjoining continuously unmanured field. The extra 13 bushels could only be accounted for by the manure which had been applied 25 years previously.

Conclusion.

The preservation and rational use of barn yard manure lies at the base of successful agriculture in Nova Scotia. In fact, the manure heap has been termed "The farmers' bank account." The possibilities of waste from this account have been, we think, clearly shown in this article. Gradually these sources of waste are being stopped, and it is to be hoped that the practice of every Nova Scotia farmer, so far as the conservation of this fertility bank account is concerned will be so improved in years to come that the product of our fields will be correspondingly increased.

Questions and Answers about Barn Yard Manure.

1. What can a farmer afford to pay per ton or cord for manure to haul to his farm?

Ans. A cord of manure weighs approximately 3 tons. As figured in the previous article a ton of average manure contains about $2.60 worth of plant food. Livery stable manure has about the same value, although if a large amount of straw is present, a load will weigh considerably less than a load of solid manure. Generally this manure has to be stored, and, depending upon the system and length of storage, will lose from 15 to 50% of its value so that, when applied to the land, the original ton will contain from $2.21 to $1.30 worth of plant food. Then one must figure how many loads he can haul per day and so make an estimate of the cost of hauling. These figures will vary depending upon the length of haul, and other conditions, so that every one must make a special calculation for himself. In the final summing up, do not forget the value of the humus in the manure to your land.

2. Is there much difference in the value of manure from well fed vs. poorly fed stock?

Ans. A ton of manure from well fed stock may be worth more than twice as much as from poorly fed stock. A steer for example that is fed all the mixed hay he wants together with 40 lbs. of turnips and 6 to 8 lbs. of mixed meal will produce about 100 lbs. of manure per day worth about 14c. Another steer fed only hay, straw and turnips will produce an equal quantity of manure, but worth only about 6c i. e. less than half the value for the same weight. Some manure is therefore worth nearly $3.00 a ton and other manure little over $1.00.

3. How could one calculate the approximate value of the manure produced by his stock per day?

Ans. The sub-jointed table II gives the manurial constituents of the common farm fodders together with their value, and, it may be assumed that the percentage of these constituents voided in the manure by different classes of animals is as in following table I:

Table I.

Kind ot Animal		Percentage Fertilizing Ingredients Voided in the manure.
Young growing animals	about	50%
Milk cows	"	75 "
Fattening cattle	"	95 "
Matured horse	"	95 "
Fattening pigs	"	85 "
Fattening sheep	"	95 "

With the aid of the figures in the foregoing table together with the figures presented in the following table one can make a very close estimate on the value of the manure produced by various classes of stock. The value is calculated as in the previous article on a basis of Nitrogen 17c per pound, Phosphoric Acid 6c per pound, Potash 5c per pound.

Table II

Manurial Value of Fodders.

Pounds Contained in one Ton.

Fodder	Nitrogen	Phosphoric Acid	Potash	Mauurial value per ton
Timothy hay	25.2	10.6	18.	$5.82
Red Clover hay	41.4	7.6	44.	9.69
Mixed Meadow Hay	28.2	5.4	31.	6.67
Oats	41.2	16.4	12.4	8.61
Barley	30.2	15.8	9.6	6.56
Corn Meal	36.4	14.0	8.0	7.43
Wheat	47.2	15.8	10.0	9.47
Buckwheat	28.8	8.8	4.2	5.63
Wheat Middlings	52.6	19.0	12.6	10.71
Wheat Bran	53.4	57.8	32.2	14.16
Cotton Seed Meal	135.8	57.6	17.4	26.41
Linseed Oil Cake Meal	108.6	33.2	27.4	21.82
Gluten Meal	94. to 126.	66.	100.	24.94 to 30.38
Oat Straw	12.4	4.0	24.8	3.56
Barley Straw	26.2	6.0	41.8	6.90
Wheat Straw	11.8	2.4	10.2	2.66
Potatoes	6.2	2.4	9.2	1.66
Turnips	3.8	2.4	9.8	1.28
Mangels	3.8	1.8	7.6	1.13
Cows Milk	10.6	3.8	3.6	2.21
Leaves	15.	3.2	6.0	2.90
Saw Dust	2.	4.	8.	.66

If you know the number of pounds of each kind of fodder consumed by your stock per day, it will not be difficult by the aid of table No. II to calculate the total manurial value of the fodders and then, by the aid of table No. I to calculate how much of this will accumulate in the manure. Always however remember that, depending upon the system of storage, you will lose approximately 15 to 50% of this value before getting the manure on the land.

4. Will it pay a farmer to build a manure cellar?

Ans. A manure cellar will prevent loss by leaching and to some extent loss by fermentation. At the same time, fermentation may occur in the cellar and it will cause just as big a loss there as if the manure were stored out of doors. In general, where bedding(straw etc.)is scarce manure cellars are indispensible. But, in those parts of the country where lots of straw and other litter are available, manure may be safely stored out doors provided the heap is placed so that no liquid can run away and provided the soil is of such texture that very little liquid can leach down into it. Care must also be taken to prevent rain from the eaves of the barn, etc. from falling upon the manure. In addition the heap must be kept level and compact and enough litter must be used so that even the heaviest rain will be absorbed and not soak through. For Nova Scotia conditions, manure cellars are generally to be recommended. In large grain growing countries like parts of Ontario and the West where there is lots of straw, manure cellars are not so essential.

5. Will it pay to keep the liquid manure separate from the solid manure?

Ans. Seldom in Canada, unless in the case of the market gardener. In Europe, the practice is a common one. In America it is generally considered better to use sufficient litter to absorb the liquid and so to apply both the solids and liquids mixed together. To keep the liquid separate means extra cost for tanks, pipes, etc., troubles with these stopping up, and worst of all, danger of freezing. More over, since the liquid contains mostly nitrogen and potash and the solids mostly phosphoric acid, the system of separate application is likely to lead to one sided manuring. Gardeners sometimes find liquid manure very valuable especially to force early crops.

6. Should manure be ploughed under deeply or kept near the surface?

Ans. Always keep manure as near the surface as possible. It is better to have the humus of the soil reasonably concentrated in the top four or five inches than to have it thinly distributed through eight or more inches. If the manure is not too strawy harrow it in; if it is strawy plow it in as lightly as possible.

7. Will manure that is applied to the ground in the Spring or Summer or Autumn waste if it is not plowed or harrowed in immediately?

Ans. Manure that is not plowed or harrowed in may, first of all, in warm weather, lose considerable nitrogen in the form of ammonia. Also it may become so dry and hard as to require a long time before it can become incorporated into the soil. Always therefore, from the time the spring has opened up, until the last of the fall, try to harrow or plow manure in as soon as possible after it is spread; and do not top dress hay fields unless you feel reasonably certain that rain will soon fall.

8. What can a farmer afford to pay either in cash or labor for bedding for cattle?

Ans. As per table in question 3 a ton of oat straw contains $3.56 worth of plant food, and a ton of leaves $2.90 worth. The plant food in these becomes slowly available, and therefore it would take a good many years before the farmer will get returns from the plant food. It must, however, be remembered that the principle value of bedding, etc. is that it absorbs the liquid and prevents waste of that the most important part of the manure. Hence one can pay rather more than the figures given for a ton of these materials and be sure to get his money back. How much more he can afford to pay will depend upon the premium he is willing to pay for clean stables, cattle, etc.

9. Is Saw-dust a good material to use for bedding?

Ans. A ton of saw-dust contains about 66c worth of fertilizing ingredients which will take many years to become available. Saw-dust, however, is a splendid absorbent. On heavy lands saw-dust is valuable for its physical effect in opening up the soil. On light lands, the effect is not desired. Still, even on light land farms, it is very much better to ues saw-dust than to use no absorbent at all.

10. Is swamp muck good?

Ans. Swamp mucks vary largely in analysis, but are usually rich in plant food. It is important that the muck be thoroughly air dry before being brought to the stable. It will then prove one of the best absorbents that could be secured and will also add very largely to the manurial value of the heap. By all means use swamp muck if you can get at it with a reasonable amount of labor.

11. What is the value of the manure produced by a cow, horse, or other farm animals in the year?

Ans. Roberts (see "The Fertility of the Land") places the following values on the fertilizing matter produced yearly by farm animals.

Animal	Value per year.
Horse	$27.05
Cow	37.48
Sheep	2.44
Pig	3.31

Do not forget that this is the value of the manurial constituents in the freshly voided manure. There may be a loss of somewhere from 15 to 50% of this value before the manure becomes incorporated with the ground.

COMMERCIAL FERTILIZERS.

By M. Cumming.

Commercial fertilizers will never take the place of soil tillage. Their application to soils that are in a poor state of tilth, or that are too wet and cold, will never rectify these defects. Nor will commercial fertilizers quite fill the place of barnyard manure, for, as has been shown in the article on that subject, barnyard manure surpasses commercial fertilizers in that, by using it, the farmer directly adds vegetable matter and germ life to the soil, which can be accomplished only indirectly, and at best not as satisfactorily, by the use of commercial fertilizers—viz., by the plowing under of green crops, especially clovers. Nevertheless, commercial fertilizers are used with profit in most of the older settled countries of the world, and can be used with profit in Nova Scotia. The fact remains, however, that much application of commercial fertilizer in our province is giving poor results and oftimes a loss. **But the fault does not always lie with the commercial fertilizers—rather it is with the improper use of the fertilizers.** We, therefore, deem it wise, in connection with this series of articles, to discuss the nature, character, and use of commercial fertilizers. Before entering into the subject, we premise that

The Physical Condition of the Soil is of Greater Importance than the Chemical Condition.

The farmer should never forget that the physical condition of the soil (fineness of particles, capacity for holding water, etc.) is of greater importance than the amount of plant food the soil contains. As shown in another article, even the poorest soils of Nova Scotia contain sufficient plant food for many more successive bumper crops than have yet been produced. But most of this plant food is locked up in an unavailable condition. **Tillage, in the widest sense of the term, is the key the farmer has for unlocking the stores of latent fertility.** The farmer, therefore, who adds plant food in the form of costly fertilizers without first trying to set free the latent store in his soil is not only farming against the dictates of nature, but is involving himself in unprofitable expenditure. Furthermore, he is not getting even the returns he should from the fertilizer. First and foremost, his attention should be directed to the plowing, harrowing, drainage of, and addition of humus to his lands—**after these things, not before, commercial fertilizer.**

What is Commercal Fertilizer.

The term commercial fertilizer is popularly used to designate fertilizing materials which the farmer purchases, such as bone meal, potato manure, etc., in distinction from barnyard manure, composts, etc., products of the farm. More strictly the term is applied to those substances which contain plant food in concentrated form. By many, commercial fertilizers, irrespective of their character, are termed "phosphates," a term which is usually inaccurately used, as it should be applied exclusively to those fertilizers, such as phosphate rock, which contain phosphoric acid but not potash or nitrogen. "Potato manure," for example, is often termed "potato phosphate," but as a proper "potato manure" also contains potash and nitrogen, it can no more correctly be termed a phosphate than a potato fertilizer. The inaccurate use of the word is probably due to the fact that the first fertilizers used were fertilizers containing only phosphoric acid and were hence called phosphates, there being at that time no special nitrogen or potash manure on the market.

The Essential Elements of Fertilizers.

In order that plants may grow, the following elements must be available:

Carbon (secured from Carbonic Acid in the air).

Hydrogen (secured from water).

Oxygen (secured from air and water).

Nitrogen, phosphorus, potassium, sodium, calcium, magnesium, iron, aluminum, sulphur, silicon, and chlorine (secured from the soil).

All of these elements which plants obtain from the soil are necessary for plant growth, but experience has shown that only the first three, nitrogen, phosphorus and potassium are likely to be deficient in average soil. Therefore, when we purchase fertilizers we purchase them for the sake of the quantities of nitrogen phosphorus, and potassium they contain. In addition when a soil is sour, a much more common condition than is supposed in the old cultivated lands of Nova Scotia calcium (lime) is of importance too, not as a plant food, but to correct the acidity or, in popular phrase to sweeten the soil.

Nitrogen is intimately associated with the formation of leaves and stems and produces a rich green color in plants. Hence an abundance of nitrogen in the soil is shown by extreme luxuriance of leaf and stem. Too much nitrogen retards the maturing of plants and will cause crops to "lodge." With such garden crops as lettuce, cabbage, etc. which are harvested green, it is hardly possible to have too much nitrogen present, but with such crops as cereals, potatoes, etc. which are to be matured, an over supply is injurious. The absence of sufficient nitrogen is indicated by lack of green color and stunted growth.

Phosphoric acid is most intimately associated with the development of the seed of plants. It is also important in the first stages of growth of the seedling. Its presence hastens maturity and in the case of oats and similar crops will insure a larger weight of grain to straw than when there is a deficiency. The absence of phosphoric acid is best indicated by the slow maturing of plants and by an underdevelopment of seeds.

Potash is most intimately associated with the production and transportation of carbo-hydrates (starch, sugar etc.) in the plant. Hence plants, rich in starch, like potatoes, generally require an abundant potash supply. Potash has a marked effect upon the development of the leaves and of the woody part of the stems. When an abundant supply of potash is present the maturing of plants is delayed. It is also believed that the color and flavor of fruits is promoted by potash. The absence of sufficient potash is generally indicated by weak brittle stems with weak joints and by a lack of firmness in the leaves.

Note:—Of these three essential substances, nitrogen is the only one which in a state of nature exists by itself in an uncombined condition. Nearly four fifths of the air is made up of pure nitrogen.

Phosphorus always exists in a state of nature in combination with oxygen and some such base as lime, iron, alumina etc.

Potash also, in a state of nature exists in combination with oxygen sulphur, chlorine, silica, etc.

For these considerations fertilizer manufacturers have for the most part adopted the convention of stating the percentage of:

Nitrogen N	as	Nitrogen N
Potassium K	"	Potash K_2O
Phosphorus P	"	So called Phosphoric Acid P_2O_5 This is strictly Phosphoric Pentoxide. (Phosphoric Acid is H_4PO_4).

The tendency among the latest writers is to state simply the amounts of nitrogen, N, Potassium, K, and Phosphorus, P, but as manufacturers naturally stick to the old convention, we have in this article referred to Nitrogen, N, Potash, K_2O, and Phosphoric Acid P_2O_5.

What Does a Bag of Commercial Fertilizer Contain.

If a person buys a 100 pound bag of Nitrate of Soda he will get in it about 15 lbs. of nitrogen and the balance will be sodium and oxygen which are not essential elements of plant food. In the same way if he buys a complete turnip fertilizer, on the tag of which it is stated that this fertilizer contains say 2% nitrogen, 2% potash and 8% phosphoric Acid, he will get out of the total 100 lbs. in the bag only 12 pounds of these essentials. The rest is of little value. However, it is impossible to make a commercial fertilizer containing nothing but the essentials, nitrogen, phosphoric acid, and potash. There must be some basic material with which these substances can combine. This substance is not "filler". But many fertilizers do contain "filler" i. e. material added in order that the fertilizer may be sold at a lower figure, and so obtain a market with that class of farmers who are bound to buy the cheapest goods even when, as is invariably the case with commercial fertilizers, the highest grade and most expensive fertilizers are actually the cheapest. For the purpose of "filler" a manufacturer may use ground gypsum, dried swamp muck, ground lime stone and other substances.

Substances from Which Fertilizers are Made.

Of the three essential elements of plant food, the nitrogen may be derived from a number of materials, for example, nitrate of soda, blood meal etc; the phosphoric acid from rock phosphate, bone meal, tankage etc; and the potash from wood ashes, muriate of potash, etc.

Nitrogenous Fertilizers.

Nitrogen, as used in fertilizer, is derived from refuse animal matter of all sorts and from nitrate of soda and sulphate of ammonia, and of recent times by a process of manufacture from the air. Each will be treated in a separate paragraph.

Nitrate of Soda is a crystalline substance resembling coarse salt in appearance. It all comes from large natural deposits in Chili which supply over a million tons per year. In a hundred pounds of nitrate of soda, there are about 15 to 16 pounds of nitrogen all of which is immediately available to the plant, for which reason it is the most desirable nitrogenous fertilizer to use where immediate results are sought. When used in large quantities it should, for this reason, be applied in successive small applications, rather than at one application. It is quoted at present in Nova Scotia at from $50.00 to $60.00 per ton.

Sulphate of Ammonia is a by product in the manufacture of coal, gas, animal charcoal and coke. It closely resembles in appearance nitrate of soda. It is the richest in nitrogen of all fertilizing materials, containing from 20 to 23 per cent. nitrogen. It is usually sold in Nova Scotia at from $10.00 to $15.00 per ton more than nitrate of soda. Even at this increased price, a unit of nitrogen in Sulphate of Ammonia costs less than a unit in nitrate of soda. To offset this, the nitrate of soda acts more quickly. When both are easily obtainable it is good practice to mix them and so combine in the mixture the advantages of each.

Dried Blood.

This is blood from the slaughter house, dried by artificial heat, and made into the form of reddish to blackish powder. There are different grades offered on the market, the lowest containing 7 per cent. to 9 per cent. of nitrogen, and the highest 10.5 to 12 per cent. Prices vary with the quality but in Nova Scotia are usually so high as to make dried blood unprofitable to purchase. It is extensively used in the manufacture of mixed fertilizers, and as the nitrogen is not so quickly available as that from nitrate of soda, it proves valuable in supplying the needs of crops during the latter part of their growing period, a matter of great importance when barnyard manure is lacking.

Horn Meal, Leather Meal.

These by-products of various manufacturies are often made into fertilizers. Each contains from 10 per cent. to 12 per cent. nitrogen, but in both the nitrogen becomes very slowly available, and hence is of much less value than that from blood or nitrate of soda. Some mixed fertilizers, particularly low grade ones, derive much of their nitrogen from these sources. They will contain their full percentage of fertilizing ingredients, but will act so slowly that they should be sold at much less money than fertilizers equally rich in nitrogen, but containing their nitrogen from blood meal or nitrate of soda, etc.

Tankage consists of dried animal wastes from the large slaughtering establishments Owing to the different ingredients of which it is composed, (offal, small bones, tendons, waste flesh, hair, etc.,) it varies in analysis. Tankage contains phosphoric acid as well as nitrogen, and the percentages of the two vary. When the phosphoric acid is high the nitrogen is low, and *vice versa.* It contains from 4 per cent. to 9 per cent. nitrogen, and 3 per cent. to 12 per cent. of phosphoric acid. These are about as easily available to plants as the nitrogen of blood meal. Tankage is, accordingly, a very satisfactory substance to apply to the land by itself or to mix with other fertilizing materials in mixed fertilizers. Like dried blood, it is usually quoted at a high figure in Nova Scotia.

Dried Fish, or Dried Fish Offal.

There are in the Maritime Provinces several dog-fish rendering factories, established by the Dominion Government, where oil is extracted from dog fish and the remaining product dried and ground up for fertilizer. This fertilizer contains 8.6 to 9 per cent. nitrogen, 3.6 to 4 per cent. phosphoric acid, 12 per cent. moisture and 2 per cent. oil (officially quoted 10½ to 11 per cent. ammonia and 8 per cent. to 9 per cent. phosphates, for explanation of which see pages 87 and 89.) So far as analysis is concerned this dog fish fertilizer ought to be equally as good as tankage and in comparison with this and other fertilizers should be worth upwards of $40.00 per ton. It is sold f. o. b. at the factories for $20.00, and while the presence of some oil makes it a little slow in becoming available for plants, it is unquestionably one of the cheapest and most satisfactory at the price, fertilizers that a farmer can purchase. Unfortunately the product of the factories is far below the demand, and, while it is known that the Government manufactures at a loss, yet is it our hope that the Government will speed up the destruction of dog fish and the consequent manufacture of this valuable fertilizer.

Along the Atlantic coast of the United States a fish called Menhaden is used extensively as a source of oil and fertilizer. The fertilizer analyzes about the same as that from the dog-fish, but, as we have seen it, it is usually freer from oil and gives more immediate returns. There are also fish fertilizers made from the residue of canning factories, but these are not as good as those made from the whole fish.

Bone Meal, Hoof Meal.

Bone meal is valuable mostly as a source of phosphoric acid, but it also contains considerable nitrogen. Its average analysis is 21 to 22 per cent. phosphoric acid, and 3 to 4 per cent. nitrogen, (see also page 89.) Hoof meal, which comes largely from the glue factory, contains about 12 per cent. of nitrogen, which becomes available about as easily as the nitrogen of tankage.

Peruvian and other Guanos are composed of the accumulated droppings of fish-eating birds mixed with the dead bodies of these birds. These have accumulated in a rainless district off the coast of Peru, in South America. This fertilizer is rich in nitrogen and also contains some phosphoric acid. The supply, however, is mostly exhausted, and there is very little genuine guano available.

Cottonseed Meal and Linseed Meal, both of which are very rich in nitrogen, were formerly used as nitrogenous manures but their value for feed is now so well known that they are no longer available as fertilizers.

Lime Nitrogen or *Cyanimid* (20 to 22% nitrogen) and *Nitrate* of *Lime* (13% nitrogen) are two recently available sources of nitrogen which have not, however, been put on the markets in Nova Scotia up to the present time. Both are the product of the fixation of the nitrogen of the atmosphere, the former with lime and carbon, and the latter with lime. For the manufacture of the former there is a plant at Niagara Falls and a number in various parts of Europe. The latter is manufactured in Norway. For the purpose of manufacture, cheap power by which cheap electric current can be generated is necessary. In the Cyanamid process the nitrogen is induced to combine with lime and carbon at a temperature of 1000 degrees C, and in the nitrate process, the union is brought about at a temperature of 3000 degrees C. Cyanamid of lime, being at first rather poisonous to plants, should be applied to the land at least two weeks before seeding, but the nitrate of lime may be used in the same way that nitrate of soda is used. When one considers the practically unlimited quantities of nitrogen in the air he need never fear a famine of nitrogen fertilizers, more especially as these processes of manufacture become further perfected.

Relative Availability of Nitrogen from the Different Substances.

Although a substance, such as leather meal, may be rich in nitrogen, yet the nitrogen from such substance is of no value to plants until, by the processes of the soil, it is changed into a simple soluble form (chemically the nitrate form). In the case of leather meal, this transformation goes on slowly, and plants consequently get little benefit in one season from an application of this substance. So also horn meal. At the other extreme, nitrate of soda and calcium nitrate contain their nitrogen in the simple nitrate form in which plants require it, and hence nitrate of soda gives immediate results. Sulphate of ammonia contains its nitrogen in the form of ammonia, which has to be changed to nitrate, a change which is easily brought about. Hence, sulphate of ammonia, though not as quick acting a fertilizer as nitrate of soda, ranks next to it. Next comes calcium cyanamide and then dry blood, and following these in order, fish, hoof meal, tankage, bone and leather. From this it is evident that if a farmer wishes to use a mixed fertilizer (potato manure, turnip manure, etc.,) intelligently, he should know, not alone the percentage of plant food, but the substance from which this plant food is derived.

If applying any of these separately or mixing them with other substances to form a complete fertilizer, the following principles should be followed:

If the crop for which the application is intended is a quick growing crop which it is important to force, such as a garden crop, it is best to use nitrate of soda, calcium nitrate or sulphate of ammonia. With other crops, such as turnips or corn, the greater part of the growth of which is made at the latter part of the season, the slower acting fertilizers, blood meal, or tankage, or fish may be used. Many agriculturists prefer to use a mixture of these, *i. e.*, some nitrate of soda for immediate effect, some sulphate of ammonia for later effect, and some tankage or other animal product for the latter part of the growing season. High class gardeners, who aim to force crops, will usually use small applications of nitrate of soda at frequent intervals.

Ammonia and Nitrogen.

It may be that most farmers who read these pages are more familiar with the term ammonia than nitrogen. Ammonia is a gas, $\frac{14}{17}$ of which is nitrogen, the remaining part being hydrogen, which is of no direct value to plants. As people generally know ammonia and its characteristics better than they know nitrogen, fertilizer manufacturers often give the analysis of their fertilizer in terms of the ammonia rather than the nitrogen they contain. In doing this, some at least are no doubt actuated by the fact that the figures representing the percentage of nitrogen are smaller than those giving the percentage in terms of ammonia. For example, a fertilizer may be advertised to contain 5 per cent. ammonia. Since 14-17 of ammonia is nitrogen, this same fertilizer would be said to contain 14-17 of 5 equals 4.1 per cent. nitrogen—a lower figure, which may not look so imposing to the buyer as the larger figure. In the general trade today the analysis of fertilizers is more often given in terms of the ammonia they contain than in the terms of the nitrogen. We ourselves would prefer if the analysis were always given in terms of nitrogen and certainly never both nitrogen and ammonia, which is often done. Provided, however, a man knows, it matters little.

Nitrogen Expensive.

The most common source of nitrogen, so far as commercial fertilizers are concerned, made use of by farmers, in Nova Scotia is nitrate of soda, in one ton of which there is about 300 lbs. of nitrogen. A ton costs between $50.00 and $60.00, at which rate a pound of nitrogen costs between 16 and 20c. This is from three to four times as much as the cost of a pound of potash or phosphoric acid; hence nitrogen is by far the most expensive substance of the three. **Farmers should therefore obtain all the nitrogen they can (1) By properly conserving the manure heap and (2) By the frequent growing of clover or vetches or peas.** A good crop of clover will abstract from the air from 100 to 200 lbs. of nitrogen per acre, so that if the whole crop is plowed under there is as much nitrogen added to the soil as would take from $15.00 to $30.00 to purchase. When the crop is cut and harvested there is still left, in the roots and crown of the plant, half this amount. The importance of clover growing on a properly managed farm can hardly therefore be overestimated.

Phosphatic Fertilizers.

Phosphorus is, by all odds, the most important fertilizing element required on Nova Scotia land, and fertilizers such as basic slag, bone meal, or acid phosphate, rich in this element will give bigger results for the money than any other fertilizers which can be purchased.

Combinations in Which Phosphorus Exists.

Phosphorus is always found in combination with other substances, mostly oxygen and lime. Under different conditions it forms four different combinations as follows:

1. Natural or 3 lime phosphate.
2. Superphosphate or 1 lime phosphate.
3. Reverted phosphate or 2 lime phosphate.
4. Tetracalcic or 4 lime phosphate.

As found in the phosphate rock of South Carolina, Florida, Tennesee, Canada and elsewhere, or bone, or tankage, or any natural form, phosphorus always exists as 3 lime phosphate i. e. one part phosphoric acid combined with three parts of lime. This form is insoluble in water and only slowly soluble in the dilute acids of the soil. Treated with strong sulphuric acid in a vat, a change is brought about in which the sulphuric acid, so to speak, steals two atoms of lime, and leaves the phosphoric acid combined with one atom of lime. This 1 lime phosphate or superphosphate is soluble in water and so can be used immediately by plants.

Generally the process of changing all the 3 lime phosphate into 1 lime phosphate is not completed, and there is formed a small quantity of an intermediate combination consisting of 2 parts of lime and one part of phosphoric acid. This is commonly called reverted phosphate or 2 lime phosphate. While not soluble in water, it is soluble in dilute organic acids such as exist in the humus of the soil. The nearest approximation that the chemist has to these soil acids is a 2% solution of citric acid, and in accordance with this the percentage of reverted phos. acid found in a fertilizer is usually quoted as "Citric Acid soluble Phosphoric Acid."

In practically all superphosphates as well as mixed phosphatic fertilizers, phosphoric acid is present in these three forms, and in accordance with this there is usually stated on the tags attached to fertilizer bags the following particulars;

So much percent water soluble phosphoric acid.
" Citric Acid " "
" Insoluble phosphoric acid.
Sometimes the first two are combined as:
So much percent soluble phosphoric acid.

In a formula for a commercial fertilizer it is quite common to see the following statement made; This contains

Phosphoric Acid 22% equivalent to
Bone Phosphate or Phosphate of Lime 48.03%.

Sometimes the word "equivalent" is omitted. These different methods of stating the amount of phosphoric acid present in a fertilizer are confusing to the buyer. The manufacturer knows that the average buying public are not familiar with the terms, and he must be sure to give figures that will create a proper impression. If one manufacturer were to state that his fertilizer contained 22% phosphoric acid and another were to state that his fertilizer contained 48.03% lime or bone phosphate, the person who knows would understand that these statements are identical, but the person who does not know might be mislead into thinking that the latter fertilizer was richer than the former. Hence manufacturers generally quote either both as in the foregoing statement, or, if they quote one, quote phosphate of lime, the higher figure.

Always remember the following:—

I pound of phosphoric acid is equivalent to 2.183 pounds bone or 3-lime phosphate. If, therefore, the analysis given contains only the percentage of bone phosphate or lime phosphate and you wish to know the amount of phosphoric acid divide by 2.183.

SOURCES OF PHOSPHORIC ACID.

1. Bone and Materials derived therefrom.

Ground Raw Bone or Bone Meal, (*See also page* 85).

(a) This is made by grinding raw bone, which should preferably be as free from fat as possible. Good bone contains about 4 per cent. nitrogen and 22 per cent. phosphoric acid (probably stated as 4.85 per cent. ammonia and 48.05 per cent. bone phosphate, for which see fore-going explanations.) The phosphoric acid, as previously stated, exists in

3-lime form. The finer the bone is ground the better. The only objection to this is that it affords a better opportunity for adulteration with lime, gypsum, etc.

Steamed or Boiled Bone.

(b) The larger proportion of bone used for meal is first steamed or boiled for the purpose of extracting the fat for soap, and it may be the nitrogenous matter for glue and gelatine. The extraction of the fat is an advantage, as its presence hinders the decomposition of bone; the extraction of the nitrogen lowers the value of the bone. Steamed bone meal contains about 1½% nitrogen and 28 to 30% phosphoric acid.

Bone Ashes and Bone Black or Bone Charcoal.

(c) Bone ashes are supplied to a limited extent, and are nearly twice as rich in phosphoric acid as pure bone. Bone black is used for refining sugar, and after it has served its purpose, comes into the market as a fertilizer. It contains about 32 per cent. of phosphoric acid, but, like other kinds of charcoal, resists decay and does not become quickly available. For this reason it is mostly used as a material for the manufacture of super-phosphates.

2. Natural Mineral Phosphates.

In Upper Canada, Norway, in South Carolina, Florida and Tennessee are to be found rocks rich in phosphoric acid. The rock of Canada and Norway is called apatite, and contains about 38 per cent. of phosphoric acid. This apatite, however, is exceedingly hard and refractory, and does not, in its simple ground form, give good results. The rocks of South Carolina, Florida and Tennessee vary considerably in structure and analysis, but are much softer in texture than apatite, and are all valuable sources of phosphoric acid. They contain from 26 per cent. to 42 per cent. of phosphoric acid in the 3-lime form.

In those parts of America not too distant from these southern States, the simple, untreated ground rock is used to a considerable extent for direct application to the land, and is, by all odds, the cheapest source of phosphoric acid. Of course, the phosphoric acid sold in this form becomes very slowly available, but if it can be purchased cheaply enough, say at not more than $6 to $10 per ton, it can be used in such large quantities as to partly offset this drawback. Owing to heavy freights, ground phosphate rock cannot be very profitably used in this way in Nova Scotia. We do, however, use a large quantity of acid phosphate, (sometimes sold as orchard fertilizer) which is made by treating this phosphatic rock with sulphuric acid, and, as previously explained, changing the phosphoric acid from the 3-lime to the 1 lime form. This acid phosphate, or, as it is sometimes called, dissolved rock, contains about 13 to 16% of soluble phosphoric acid.

3. Phosphatic Guano.

A few years ago guano was sold in large quantities and, along with bone meal, was the only commercial fertilizer well known to farmers. Some guanos were rich in nitrogenous matter, others were richer in phosphoric acid. The supply is now almost exhausted and very little genuine guano can be obtained on the market. These guanos are chiefly modified excrements of fish eating fowls. In rainless districts, like Chili and Peruvia, the guano is especially rich in nitrogen; but in the rainy districts, as on a number of islands in the West Indies, in the Gulf of Mexico, and the Caribbean Sea, the nitrogen has been largely washed out and hence the residue is relatively rich in phosphoric acid. As, however, the supplies of these are about exhausted, they are not now of great importance to our farmers.

4. Basic or Phosphoric Slag, Sometimes Called Thomas' Phosphate.

This material is a by-product in the manufacture of steel by the Bessemer process. Iron contains a small amount of phosphoric acid which is injurious to the quality of steel and is removed by mixing with the iron ore about an equal quantity of lime stone. The mass is raised to an intense white heat and the lime then combines with the phosphoric acid, taking it away from the iron. This combined lime and phosphoric acid forms a scum floating on the surface of the moulten metal. When it has cooled off and hardened it is ground in mills to such a degree of fineness that 80% of the powder will pass through a standard sieve of 10,000 meshes to the square inch. This is Basic Slag.

A Bit of Chemistry.

The Composition of Basig Slag varies. According to Wheeler, (see Manures anf Fertilizers page 193) it may be considered as ranging between the following limits:

	Per Cent
Calcium oxide (lime)	40-60
*Phosphoric Acid (P2O5)	10-20
Iron Oxide	10-20
Silica	5-15
Mognesium oxid	3-6
Manganese oxid.	2-6
Alumina	1-3

*Strictly phosphorus pertoxide (see note p—82).

The amount of free lime in Basic Slag is now less than formerly owing to the greater amount of Silica introduced into the furnaces. It usually ranges from 1 to 6%. However, (see same author page 194) the amount of lime capable of acting as a base (neutrilizer of acids) as determined by Hendrick ranges from 13.6 to 28.3%, i. e. with each ton of slag you apply the equivalent of from 272 to 566 pounds lime.

Originally it was considered that the phosphoric acid in Basic Slag was tetracalcic phosphate i. e. one molecule of phosphoric acid combined with four molecules of lime, but recent investigation has gone to show that, in addition to this form, there is also found phosphoric acid in combination with calcium and silica, the formula according to Stead being (CaO)5 P205SIO2 Both of these combinations are abnormal, and are quite easily disolved in weak acid such as exist in the soil. The official method of determining the amount so soluble is by dissolving the powder in a 2% solution of citric acid which in strength and general character approximates the natural acids of the soil.

The Relative Values of Basic Slag.

The value of any Basic Slag depends upon:

1. The total percentage of phosphoric acid.

2. The percentage of phosphoric acid soluble in a 2% solution of citric acid. Usually this will be from 80 to 100%.

3. The fineness of grinding. In regard to this point all slags, so far as we know, are now about equally good. They are usually quoted at 80% fine by which is meant that 80% of the powder will pass through sieve containing 10,000 meshes per inch.

Some vendors of Basic Slag in selling their product, lay most stress on the total percentage of phosphoric acid present. Others claim that Slag should be valued on a basis of the amount of phosphoric acid soluble in citric acid. All things considered, we would prefer to buy on the latter basis, for this precludes the likelihood of our buying an adulterated slag. It is quite possible to add to Basic Slag ground rock phosphate, a cheaper product, the phosphoric acid of which is not soluble in a standard citric acid solution. Therefore buying on the basis of citric soluble phosphoric acid is the safer method.

By far the greatest quantity of Basic Slag used in the world is manufactured in England, Belgium and Germany. The Slags of United States are too low in phosphoric acid to be profitably used as fertilizer. Within recent years, however, very considerable quantities of slag have been ground at Sydney, Nova Scotia. The percentage of phosphoric acid in this Sydney Slag is not as high as many of the European Slags, but its value is considerably enhanced by the fact that the phosphoric acid of the No. 1 product is all soluble in a standard solution of citric acid.

Use of Basic Slag.

Basic Slag, when sold right, is a cheap source of phosphoric acid, the most essential fertilizing element for Nova Scotia soils. Besides, as already explained, it contains the equivalent of from 270 to 570 pounds of lime per ton, and that in a very fine powder capable of neutralizing acid soils, and when it is considered that a large proportion of the soils of Nova Scotia are slightly acid, this lime must be regarded of considerable value. Slag is especially valuable in the presence of considerable moisture and hence usually gives excellent results on clay soils.

For acid soils there is no other single fertilizer that will give more satisfactory returns. Slag has given better results than any other single fertilizer we have used in securing a good stand of clover, one of the most important factors in enriching soils. The only material which has equalled it on the College Farm has been the addition of ground lime stone to fields already treated with manure and various fertilizers. In some of our experiments, on a slightly acid but well drained upland soil slag has given somewhat better results with turnips than has a corresponding quantity of acid phosphate. About the only crop on which we would not recommend the free use of Basic Slag is potatoes, fot it is inclined, like wood ashes, to bring about conditions favorable for the growth of scab.

5. Other Manufactured Phosphatic Fertilizers.

Superphosphate, acid phosphate etc.

When bone or natural rock phosphate in which the phosphoric acid exists in the insoluble three-lime form, are treated with sulphuric acid, there is formed superphosphate or acid phosphate i. e. one lime or soluble phosphoric acid. There is always present small quantities of two-lime phosphate (soluble in citric acid) and some three-lime phosphate (insoluble) but the major part is one-lime or water soluble phosphoric acid. In this form the phosphoric acid is immediately available for plant use. Moreover, being soluble in water it becomes evenly distributed through the soil so that the roots of plants are supplied with food in every direction. Superphosphate or acid phosphate will give quicker results than any other form of phosphoric acid, and except where soils are acid should be used for turnips, potatoes, and all kinds of hoed and market garden crops. Recent experiments carried on at Kentville, Truro and at various other stations indicate that on soils which are deficient in lime, as are most Nova Scotia soils, it will pay to apply some form of lime, preferably ground lime stone along with acid phosphate.

A New Phosphoric Fertilizer.

Patents have been obtained in Canada and the United States covering an electric process for the manufacture of a high grade phosphatic fertilizer to be manufactured out of phosphate rock, felspar and ammonia. This fertilizer has not yet been put on the market, but if it comes up to sample will contain nearly 50% of soluble phosphoric acid, 6% nitrogen and 4% potash. This is a very high grade fertilizer and, if it can be sold at a reasonable rate, will prove of extreme value.

Which Phosphatic Fertilizer to Use.

The Nova Scotia farmer may use as a source of phosphoric acid either bone meal, basic slag, acid phosphate, mixed fertilizers, or raw rock phosphate, and is often at a loss to know which to depend on. In the paragraphs dealing with basic slag and acid phosphate, we have given the main points of difference. The final deciding factor between these two is likely to be the matter of price. The following illustration may serve to bring this out. Supposing one could buy acid phosphate containing 15% soluble phosphoric acid at $15.00 per ton and basic slag containing 12.8% soluble phosphoric acid at $13.50 per ton, he will find that in the case of acid phosphate he will get in each ton 300 lbs. of soluble phosphoric acid which will therefore cost him 5.3c a pound; in the case of basic slag he will get 256 pounds of soluble phosphoric acid in a ton which will cost him 5.27c a pound. He therefore buys a unit of phosphoric acid at about the same price in each material. If his soil is acid, it is in general better to use slag, or in any case where seeding down with clover, slag will generally give better returns. Under other conditions, with hoed crops etc. acid phosphate will generally prove the best buy.

Bone meal in comparison contains about 22% phosphoric acid and 4% nitrogen (both insoluble but becoming gradually available). At $30.00 per ton one would secure for this amount 440 pounds phosphoric acid and 80 pounds of nitrogen. The nitrogen becomes slowly available and its value will vary with the character of the soil. A fair valuation for the eighty pounds will be $10.00, which means that the remaining 440 pounds of phosphoric acid will cost $20.00 equal to about 4½c a pound.

It is therefore evident that bone meal is in general at the price quoted, a cheaper source of phosphoric acid and nitrogen than either of the other materials. On heavier soils, especially those containing considerable humus, bone meal ranks as one of the most satisfactory sources of phosphoric acid and nitrogen which the farmer can buy.

One may also buy phosphoric acid in the various mixed fertilizers such as potato phosphate etc. which are offered for sale. As a rule phosphoric acid in these mixed fertilizers will cost a little more than in the straight fertilizers described above. This question will be more fully discussed in a subsequent part of this article.

Of late, considerable interest has been aroused in regard to raw rock phosphate which is now being extensively used in parts of the United States within reasonable access of phosphatic deposits. This raw rock contains from 26 to 42% of phosphoric acid, which, however, exists in the three-lime or insoluble form and becomes only slowly available for plants. Unfortunately freight rates to Nova Scotia are high and at the present time it cannot be bought at less than $12.00 or $13.00 per ton in comparison with $6.00 to $10.00 in those parts of the States where it is extensively used. Even at this price it would be worth using on soils rich in humus, the acids of which would help to make the phosphoric acid soluble, but as few Nova Scotia soils are rich in humus, we would advise farmers to proceed cautiously with this fertilizer.

Potash Fertilizers

If the reader will review the figures of soil analysis which appear at page 4, he will observe that most Nova Scotia soils contain considerably more potash than phosphoric acid. On the other hand by reference to the table on page 76 he will further observe that:

1. Such crops as timothy, clover, potatoes, turnips mangels, etc. all remove from two to three times or more potash than phosphoric acid. True, oats, barley, wheat and other cereal grains remove more phosphoric acid, which, however, is to a large extent offset by the great excess of potash in the straw.

2. The fodders usually bought on the farm, which enrich the manure such as oats, bran, middlings, oil cake meals, etc are richer in phosphoric acid than in potash.

3. Since four-fifths of the potash contained in barn yard manure is in the liquid, and practically all the phosphoric acid is in the solid manure, it is clear that on many farms there must be far greater losses of potash than phosphoric acid.

It would therefore appear that long tilled soils must need the application of potash at least as much as phosphoric acid. Actual experiments carried on in other countries and also in Nova Scotia have shown striking results from the application of potash especially for such crops as potatoes, clover, mangels etc., and even cereals, turnips etc. have also responded largely to the application of potash.

In general, however, our observations have led us to believe that, at least at the present time, less returns will be received from money invested in potash for Nova Nova Scotia soils than for any other of the elements. On the College Farm, with the exception of a single experiment with potatoes, we have observed practically no results from the application of potash. However, it should be remembered that on the College Farm, we carefully conserve the liquid manure and we use all the straw which is rich in potash for bedding so that there is little potash actually sold off the farm. As to whether it will pay individual farmers to buy potash is a question that should be carefully determined by every farmer who uses commercial fertilizer. It will be a comparatively simple matter, even if a farmer does not care to undertake extensive fertilizer experiments, to apply a little potash to a small area of the potato, oat or hay field and record results.

At the same time potash which is almost solely obtained from Germany, is now difficult to secure and many farmers who formerly used it are dispensing with it and even high grade potato fertilizers which were formerly made to contain 10% of potash do not now contain more than 2 to 4% of potash. In this connection it should be observed that decaying organic matter and also lime will set free considerable potash that is held in an insoluble condition in the soil. On all those farms, therefore, where barn yard manure is available (and where the liquid which contains four fifths of the potash is conserved) and where green crops are frequently plowed under, more especially if there is abundance of lime either naturally present or artificially applied, potash starvation need not cause any worry at least as long as the present war endures.

There are three chief sources of potash available to the Nova Scotia farmers; (1) wood ashes; (2) German potash salts; (3) Kelp and other sea fertilizers.

Wood Ashes.

Those, who are familiar with the old process of making soap, know that it was customary to leach wood ashes to obtain from them potash or as it was usually called, lye. About 8.5 per cent. of average wood ashes consists of potash. There are two other important ingredients in ashes, viz: phosphoric acid and lime; but it is for the potash they contain that ashes are most valued in agriculture.

Wood ashes vary in analysis, depending upon the following conditions: (*a*) Whether leached or unleached ashes. (*b*) The kind of wood from which the ashes were derived. Ash from hardwood is more valuable than ash from soft wood. (*c*) The part of the tree burned. Ashes from twigs and small branches are richer than those of the trunk and, in general, the smaller and younger the wood burned the better are the ashes. (*d*) The amount of foreign matter, such as charcoal and various refuse matter, which depreciate the value of the ashes.

The following is an analysis of average house ashes:

Potash	8.5	per cent.
Phosphoric Acid	2	"
Lime	35.	"

Phosphoric acid, as previously shown, costs from 4½ to 7 cents per pound, and potash, as will be shown, costs 5 cents per pound, and lime costs about 1-3c. per pound. According to the foregoing table a ton of average wood ashes contains:

Potash	170 lbs.	@ 5c. per lb. @	$8 50
Phosphoric Acid	40 lbs.	@ 6c. per lb. @	2 40
Lime	700 lbs.	@ 1-3c per lb. @	2 33
			$13 23

Any wood ashes we have bought for the College Farm, of which we have had analysis made, have usually contained about 1-3 less fertilizing ingredients than the above average. At the same time we have secured striking results from this wood ashes, especially when used for top dressing pasture land. Their value was particularly evident in the increased amount of white or dutch clover, but of grasses as well. It is of course common knowledge that no other fertilizer is so likely to produce conditions favorable for scab on potatoes as wood ashes.

While wood ashes are of such marked agricultural value, coal ashes are of very little value except in so far as their application may help to lighten up a heavy clay soil.

German Potash Salts.

In several parts of Germany, especially near Stassfurt are found enormous deposits of salts of a number of different kinds, which are believed to have been left behind by the evaporation of quantities of sea water in remote geological times. Mines have been established in these areas and many different kinds of salts, including common household salt and various potash salts, useful for fertilizers, are mined and manufactured. On the Nova Scotia market there are offered for sale, as sources of potash, three products of these mines: (a) Kainite. (b) Muriate of Potash, and (c) Sulphate of Potash low and high grade.

(a) *Kainite.* This is the only natural or crude potash salt which is imported into America in any considerable amounts. It contains about 12 per cent. of potash in the form of sulphate. In addition, it contains salts of magnesia and a large amount of common salt. It is sold in Nova Scotia at about $15 to $20.00 per ton, in contrast to $45.00 to $50.00 per ton for muriate of potash. The cheapness of kainite, however, is only apparent. One ton contains about 240 pounds of actual potash, at which rate the potash costs from 6 to 8 cents per pound. Muriate of Potash, as will be seen, contains about 50 per cent. of potash or 1000 pounds in a ton. Therefore at $50.00 per ton, one pays 5 cents per pound for the potash contained in the muriate, On some soils, the salts of magnesia and the common salt contained in kainite give good results and in such cases kainite is a satisfactory potash fertilizer. However, there is not much kainite offered for sale in Nova Scotia; muriate of potash and sulphate of potash, especially the former, are sold in much larger quantities.

Muriate of Potash.

(b) This salt of potash is produced by a refining process. It contains potash and chlorine, with just a small trace of other salts. As already mentioned, muriate of potash contains about 50 per cent. of actual potash, i. e., a ton, contains 1000 pounds. It is sold at normal times at from $40 to $50 per ton, so that a pound of potash in this form costs about 4 to 5 cents. At normal prices, it is the cheapest source of potash and is much more frequently used than any other potash salt. When muriate of potash is used continuously in large quantities, it will gradually cause the lime of the soil to drain away in the drainage waters. This is due to the chlorine of the muriate of potash uniting with the lime and forming with it a water soluble compound which will gradually leach away. On this account, it will usually be found good practice to apply lime at intervals on land to which muriate of potash is being added.

Sulphate of Potash.

(c) This salt is also manufactured from low grade salts in Germany and like the muriate contains about 50 per cent. of actual potash. It is sold at from $5.00 to $10,00 per ton higher than the muriate. It is considered the most satisfactory source of potash for such crops as potatoes and tobacco. Muriate of potash, when used in anything like large quantities with potatoes, produces a potato of a somewhat waxy texture; whereas the sulphate of potash, under the same conditions, produces a mealier and more desirable potato. The sulphate produces a correspondingly better quality of tobacco than the muriate. Despite these considerations the muriate of potash is much more largely used in Nova Scotia and elsewhere even for potatoes, presumably because of its being cheaper. Nor have very injurious results been observed from the quantities supplied, Possibly larger applications would lead to more undesirable results. The sulphate of potash is also superior to the muriate of potash in that it will not lead to the same depletion of lime.

Use of Potash Fertilizers.

Phosphoric acid fertilizers will give returns on probably every soil in Nova Scotia. Nitrogen containing fertilizers are equally essential. But, n regard to potash we recommend careful experimentation before investing largely in fertilizers rich in this ingredient. Sometimes experimenters will find large returns from money invested in potash but we have seen quite a few instances in Nova Scotia where the returns did not justify the expenditure.

Potash fertilizers, whether wood ashes or German potash salts, should not be used in extensive quantities. If either the muriate or the sulphate of potash are used, 300 pounds per acre may be considered the extreme application and the average about 100 to 200 pounds. Also it must be remembered that potash fertilizers, including wood ashes will burn the leaves of plants they come in contact with so that they should be applied carefully and if ever applied for top dressing always on a dry day in moderate quantity.

Sea Manures.

Various sea plants which wash up on the shore are used extensively as fertilizers along the coast of Nova Scotia. The most common plants are kelp, flat stalked rock weed and eel grass. These sea plants, as will be observed from the figures in the following table, contain all the elements of plant food but are relatively richer in potash than in either of the other elements. They may therefore be regarded as unbalanced fertilizers which, if best results are desired, should be supplemented with Basic Slag, bone meal or some other commercial fertilizer or even barnyard manure.

*Percentage Composition of Sea-Weeds.

	Water	Nitrogen	Phosphoric Acid	Potash
Broad leafed kelp	87.5	0.23	0.06	0.31
Flat-stalked rockweed	76.6	0.38	0.12	0.65
Eel grass	81.2	0.35	0.07	0.32

Note:—(See Wheeler Manures and Fertilizers page 66).

It may be further stated that these plants vary in analysis at different seasons of the year as well as in different localities.

Eel grass decomposes slowly and is not valuable for immediate use as a fertilizer. It is, however, excellent as litter for farm animals. Rock weed is about twice as rich in plant food constituents as kelp.

In parts of the United States a load of farm-yard manure is considered equal to two and a half loads of fresh sea weed or one and three quarter loads of sea weed that has laid in a pile for ten months or more. On account of being so bulky, it is not considered profitable to haul this sea manure more than six to eight miles from the shore.

Sea weed may be used for Autumn and Winter top dressing of grass lands providing it is not employed in such large quantities as to smother the grass. As a rule, however, it can be best used on land which is about to be plowed either for hoed crops or for grain and seeding down. It is a fairly quick acting fertilizer and gives the most of its results the first year. The practice of composting sea manures is considered expensive, but leaving the plants in a heap for a few months is often advantageous especially when the manure is to be hauled a considerable distance.

In parts of Scotland and elsewhere, before German potash salt mines were developed, a common source of obtaining potash was from the ashes of sea weeds which were burned by the people living near the sea shore. Potash obtained in this way is expensive and unless the German source of supply is permanently cut off it is not likely to be resorted to to any great extent. At the present time efforts are being made in several places along the Atlantic and Pacific coast to dry and then grind kelp and other sea weeds for fertilizing purposes. The product is fairly rich in potash and to a lesser extent nitrogen; it also contains small quantities of phosphoric acid. Were it not for the expense of securing the sea weeds and of subsequently drying and grinding them this process of manufacture might be largely developed. Even as it is, present exigencies may lead to the adoption of improved methods which will make these plant growing in the sea available for farm fertilizers. Unfortunately for Nova Scotia, Pacific Ocean kelp is richer in potash than that from the Atlantic Ocean.

Complete or Mixed Fertilizers.

In striking contrast to the practice pursued by the farmers of Europe, who buy the various chemicals described in the previous part of this article and mix them at home, the farmers of Canada and the United States purchase chiefly ready mixed brands of fertilizers with more or less attractive names attached. However, the practice of home mixing is gaining headway and is worth some attention.

Manufacturers whose principle business consists in making and selling mixed fertilizers such as "potato phosphate, "turnip fertilizer," "grass fertilizer," etc. for the most part contend:

(1) That the average farmer is not sufficiently familiar with fertilizers to be able to mix them intelligently.

(2) That, owing to his not having satisfactory machinery the farmer cannot thoroughly mix the various materials.

(3) That the special process of mixing in the factory induces some beneficial action on the chemical character of the fertilizer which cannot be effected in the ordinary process of home mixing.

(4) It may be further added that throughout many parts of Nova Scotia it is difficult to purchase the separate ingredients in small quantities. This is being obviated in the Annapolis Valley, as well as other parts of the province, by co-operative buying, through which agency large enough orders can be given to make possible the purchasing of any of these ingredients.

Arguments in Favor of Home Mixing.

(1) The greatest advantage from home mixing is that the farmer who follows this practice will learn just what fertilizing elements his soil requires and so will not only fertilize more intelligently but will save money. For example, by careful tests, we determined that very little advantage accrued from the application of Potash on the College Farm. Had we been using only mixed fertilizers we might have been buying a high grade mixture containing say 10% of potash, equal to 200 pounds per ton for which we would have been paying from $10.00 to $15.00 and so for every ton purchased we would have wasted a very considerable amount of money. As it is now, if we were buying a mixed fertilizer we would insist on one moderately rich in nitrogen, very rich in phosphoric acid, and containing little if any potash. **It is worth noticing too that this knowledge was derived not from elaborate chemical analyses but by simple experiments such as are outlined in the last part of this article and which any farmer could carry on for himself.**

(2) Ordinarily as fertilizers are quoted at present, the farmer can save 20% or more in his fertilizer bill by purchasing the separate ingredients and mixing them at home rather than by purchasing mixed fertilizers.

General Discussion on Factory Mixed Fertilizers.

In a part of the country where the soil is fairly uniform the best mixture for a particular crop in that section may become established. For that part of the country the mixed fertilizer sold by the manufacturer may therefore be exactly what is wanted. But because such fertilizer is the best for one particular soil formation it does not follow that it is the best on another soil. Even the farmer, therefore, who finally decides because of the convenience, etc., to use mixed fertilizers should, by experiment, determine what is the best mixed fertilizer for him to use. No agent is capable of telling him unless he has personally carried on experiments on his farm. Even an expert chemist cannot advise him with certainty, but, if he tries a few experiments, as subsequently outlined, the results will tell him.

High Grade vs Low Grade Mixtures.

In this country, high grade mixtures are usually sold at from $35.00 to $45.00 per ton. At the same time low grade goods may be sold for $25.00 per ton or less. The low price is often an attraction, but we have never yet seen an exception to the rule that **the high grade mixture, even at the high price, is the cheapest fertilizer.** A farmer can easily work this matter out for himself. In a previous article we have valued nitrogen at about 17c per pound, available phosphoric acid at 6c per pound and potash at 5c per pound. Supposing, therefore, we are offered a fertilizer mixture which is advertised to contain 4% nitrogen, 7.50% available phosphoric acid and 10% potash it is easy to calculate that this will contain, per ton, 80 pounds of nitrogen, 150 pounds available phosphoric acid and 200 pounds of potash, which at the prices quoted would bring the value of this fertilizer to $32.60. Of course it will be sold at several dollars more per ton and the manufacturer is entitled to part of this at least on account of the expense of mixing, bagging, shipping, etc. If in the same way one takes the trouble to figure the value of the plant food in a low grade fertilizer and compares this value with the selling price he will find that he is getting much more plant food for his money in the high grade than in the low grade fertilizer. **By all means buy high grade fertilizer.**

Materials Generally Employed in Compounding Home-mixtures.

The following materials may be used for compounding mixtures:

Sources of Nitrogen	Nitrate of Soda
	Sulphate of Ammonia
	Dry Blood
	Tankage.
	Fish Refuge (Dried and Ground)
Phosphoric Acid	Acid Phosphate
	Basic Slag
	Bone Meal
	Tankage
	Fish Refuge (Dried and Ground)
Sources of Potash	Muriate of Potash
	Sulphate of Potash
	Kainite
	Wood Ashes

With few exceptions any or all of these may be mixed together in almost any proportions. About the only constituent that may cause serious trouble is sulphate of ammonia, for this, when mixed with basic slag, will lose its ammonia and when mixed with muriate of potash or kainite may be changed to chloride of ammonia which is poisonous to plants. A mixture of acid phosphate and sodium nitrate ought not to be stored for a long period as it will cake and rot the sacks. The potash salts when mixed with basic slag ought not to be kept for more than one day; otherwise the mixture will become as hard as cement.

Methods of Mixing Fertilizers.

The apparatus necessary for mixing fertilizers are: (a) the fertilizers (b) a level floor, preferably cement but wood is all right (c) a shovel, preferably square mouthed (d) a broom (e) a wooden post or tamper to be used as a pulverizer (f) sometimes a screen to sift out coarse particles (g) sometimes a weigh scale.

Sweep the floor clean; empty part of the phosphatic fertilizer spreading it level on the floor; to this add part of the potash and then part of the nitrogen. It is likely that the nitrate of soda or the potash salts may be lumpy. If so, these lumps should be reduced by means of the tamper. After the ingredients have all been put together in a heap, take a shovel and turn the heap first to one side and then to the other. It is then ready for use. Sometimes, however, the practice is to put the mixed materials through a screen so as to sift out any lumps which may be thrown to one side and then reduced to a powder and added to the heap. Unless the mixture contains some of the materials in regard to which precautions are urged in foregoing, this mixed goods may be kept in a dry place for a long time before using.

What Mixture to Use

If we have endeavored to urge any one point strongly in the foregoing, it has been that each farmer ought finally to ascertain for himself just what proportion of nitrogenous, phosphoric acid, and potash fertilizers he should put in his mixtures. If he is using fertilizer to supplement barn yard manure he will not require as much nitrogenous or potash fertilizers as when he is using fertilizer alone. If he is using fertilizer on a field in which a clover sod has been plowed under the same observation may be made. If the land is very poor and largely devoid of humus he must, if he expects a good crop, use a large application of all three. However, there are certain fairly well established lines of fertilizer which are sure to give good results, although possibly not the most economical, in all soils. For example, as well established high grade fertilizer for potatoes is a 4-8-10 mixture by which is meant a mixture containing 4% ammonia (equals 3.3% nitrogen), 8% phosphoric acid and 10% potash equals 66 pounds nitrogen, 160 pounds phosphoric acid and 200 pounds potash per ton. Suppose we try to make up a heap of fertilizer that will contain these amounts of plant food elements from nitrate of soda (15% nitrogen), acid phosphate (16% phosphoric acid), and muriate of potash (50% potash), we would proceed as follows

15 pounds Nitrogen may be obtained from 100 pounds Sodium Nitrate therefore:

66 pounds Nitrogen may be obtained from 440 pounds Sodium Nitrate.

In the same way 160 lbs. Phosphoric Acid may be obtained from 1000 pounds acid phosphate; and 200 pounds potash may be obtained from 400 lbs. Muriate of Potash.

Therefore a mixture containing the foregoing amounts of plant food would be made up as follows:

440 lbs.	Sodium Nitrate.
1000 "	Acid Phosphate
400 "	Muriate of Potash
1840 lbs.	

Remember that in this 1840 pounds there is just as much plant food as in one ton of a 4-8-10 mixture. The difference in weight would be "filler." This filler is of practically no value except in so far as it gives the farmer bigger bulk for his money. In the case of low grade fertilizers the filler sometimes constitutes from 25 to 50% of the total weight. If a farmer, who is mixing his fertilizers at home, wants to use a filler to make even tons he can use good dry earth, ground limestone, or land plaster.

Cost of the Above Mixture.

Naturally quotations on all grades of fertilizers vary in different localities and in different years, and therefore the following figures may be considered more from the standpoint of indicating the method of making comparisons rather than from the standpoint of giving the actual cost. At Truro, in normal years, we have been buying nitrate of soda at $55.00 per ton, 16% acid phosphate at $16.00 per ton, and muriate of potash at $45.00 per ton. At these rates the amount of nitrate of soda used in the above mixture would cost $12.10, the acid phosphate $8.00, and the muriate of potash $9.00, making a total of $29.10. The cost of mixing should not be more than $1.00 per ton, so that the above mixture should be made up for about $30.00 per ton. It could be considerably improved by substituting for half of the nitrate of soda, a little larger quantity of blood meal or tankage which would bring the cost of the mixture to somewhere in the neighborhood of $32.00 per ton. This mixture as currently sold will cost from $38.00 to $42.00 or more per ton. It is only fair, however, to state that the figures at which we have quoted the chemicals are for cash, whereas a large percentage of the mixed goods are sold on time.

If the reader has grasped the principles used in making the above calculation, he should be able to make up on his own farm mixtures that will contain the same percentages of plant food ingredients which are to be found in any fertilizers he may purchase.

Some Good Mixtures.

For grains.

1. Basic Slag or bone meal alone at 400 to 800 lbs. per acre. Either of these will give satisfactory results on soil that is moderately rich in humus.

2. On poorer soils, the application suggested in 1 should be supplemented by manure. If this is not available use

instead, per acre, 100 pounds nitrate of soda and, if you have found that potash gives returns, 150 lbs. muriate of potash. The mixture would be still more effective if from 100 to 200 pounds of blood meal or tankage or dog fish fertilizer is added

Dog fish fertilizer alone at from 400 to 800 lbs. per acre will generally give excellent results.

3. A good general mixture for grains is a 3-8-6 mixture which can be made up as follows: 333 lbs. Nitrate of Soda, 1000 lbs. acid phosphate, 240 lbs. muriate of potash or better still, 220 lbs. nitrate of soda, 200 lbs. tankage, 875 lbs. acid phosphate and 240 lbs. muriate of potash. Instead of the tankage one might use an equal quantity of dog fish fertilizer and instead of the acid phosphate one might use 1100 lbs of 12.8% basic slag. Use the above mixture at the rate of from 400 to 600 lbs. per acre.

4. For turnips we have in general had the most satisfactory and economical results from either acid phosphate or basic slag alone added after an application of barn yard manure. Use at the rate of from 800 to 1200 lbs. per acre. But when barn yard manure is not available a good mixture would be a 4-10-4 mixture which may be secured by mixing 400 lbs. nitrate of soda, 1000 lbs. acid phosphate, 400 lbs. muriate of potash. This mixture could be improved as in the foregoing by substituting for half the nitrate of soda about an equal quantity of sulphate of ammonia or a slightly larger quantity of blood meal or tankage or dog fish fertilizer. Instead of the acid phosphate one could use a corresponding quantity of basic slag. This mixture should be used at the rate of from 800 to 1200 lbs. per acre.

5. For mangels and other field roots we would not change the mixture recommended for turnips very much, although on our own soil we would use a little more nitrogen and a corresponding amount less of potash.

6. For potatoes the 4-8-10 mixture as discussed above is excellent. On our own farm we would use less potash.

7. For garden crops, either the potato or turnip mixture will give good results. It will generally pay, however, to add some nitrate of soda once or twice after the crops have come up.

Methods of Applying Fertilizers.

Fertilizers may be applied either by hand or machine. Some modern grain seeders, turnip seeders, potato planters, etc. have attachments for sowing fertilizer. There are also various makes of broad cast fertilizer distributors on the market. Where large quantities of fertilizers have to be applied a machine is not only a great labor saver but its use will insure a more equal distribution.

Broadcasting vs Drilling.

It is a very common practice to sow fertilizers in the drills with potatoes, turnips, etc., and where a light application is made the method may be justified. In general, however, we prefer broadcasting for all kinds of crops for the following reasons;

(1) Broadcasting insures a more thorough distribution of the fertilizers in the soil and this encourages a more extensive root development for it must be remembered that if plant roots are given the opportunity they will occupy all the ground between the rows and obtain their food just as readily there as if it were placed right in the row.

(2) The crop succeeding that to which the fertilizers have been applied will grow and ripen more uniformly. In fields where fertilizer has been applied in the row to turnips or potatoes, etc., it is generally easily possible to see the rows clearly marked in the succeeding grain and grass crops. The uneveness so caused is very objectionable.

(3) Where heavy applications of fertilizers are used, broadcasting will prevent any injurious effects to the young seedlings which might be caused when the fertilizer is concentrated in the row.

When to Apply Fertilizers.

The common practice in this country is to apply fertilizers just before seeding and in general the practice is to be commended. There are some fertilizers like basic slag, bone meal, etc. the plant food of which becomes more slowly available than that of some other fertilizers. Fall application of these are consequently sometimes recommended. In favor of this it might be mentioned that none of the plant food contained in these will be lost during the winter. It is not good practice to apply more nitrate of soda at the time of seeding than the plants can reasonably consume in a few weeks. Where, as in the case of garden crops, it is desired to force the growth by means of nitrate of soda it is better to make small applications from time to time.

Fertilizer Experiments.

It is very important, as already stated, that the farmer should ascertain which fertilizing elements his soils are most in need of, and as explained this can only be accomplished by actual fertilizer tests. Ask the soil. The following experiment is especially recommended:

Plot (1) Check-Plot-Unfertilized.

Plot (2) Complete fertilizer, 200 lbs. nitrate of soda, 600 lbs, acid phosphate and 200 lbs. muriate of potash per acre.

Plot (3) Potash omitted, 200 lbs. nitrate of soda, 600 lbs. acid phosphate per acre.

Plot (4) Phosphoric acid omitted, 200 lbs. nitrate of soda, 200 lbs. muriate of potash per acre.

Plot (5) Nitrogen omitted, 600 lbs. acid phosphate, 200 lbs. muriate of potash per acre.

Care should be exercised to get as even a piece of soil as possible for this experiment. If the experimenter will carry on this test with several crops he should in the course of a few years have an accurate idea of how to fertilize his lands. It is hardly safe to base ones final judgment on the experiments of a single year, because seasonal differences will frequently change results greatly.

Some Questions and Answers on Fertilizers.

1. Can you farm properly without the use of barn-yard manure, using instead commercial fertilizers?

Ans. It is difficult and not advisable but it is done and can be done. To do so, you must grow a fairly large acreage of some "Cash crop" like potatoes, garden produce, etc. which will pay a profit on a reasonably heavy application of fertilizers. Where potatoes is the crop selected, do not forget that potatoes are sometimes difficult to market and that seeming profits may not materialize. To learn how much fertilizer a farmer could use profitably, read the subsequent article on Mr. Veinotte's methods of growing potatoes. Then you must grow and plow under clover or a similar cover crop as often as possible to supply humus. On a farm where hay and oats are the principal crops raised, commercial fertilizer farming is hardly possible unless you are sure of prices approximating $20.00 per ton for hay and 75c or more per bushel for oats at the farm. In general, live stock farming is absolutely essential on our hay and oats producing farms. Nevertheless on these live stock, hay and oats farms, commercial fertilizers can be advantageously used to supplement the barn yard manure more especially if the extra crop grown is the occasion for keeping more stock and feeding the stock better. Fertilizers pay best on such crops as potatoes, turnips and other hoed crops. Smaller applications than would be applied to these crops must be used for oats and other cereals as well as hay.

2. Are commercial fertilizers merely soil stimulants or do they actually improve the ground?

Ans. They are often regarded as stimulants which result ultimately in injuring the physical character of the soil and exhausting the plant food. It is a fact, moreover, that, where farmers have relied blindly on fertilizers they have induced this very condition. For example, farmers who have used fertilizers of any kind to encourage the growth of a crop of oats on a back field have usually had good results the first year. Frequently, however, the next application of fertilizer has given poorer results. The reason is that no measures have been taken to keep up the humus supply. If, for example, when the field was first sown to oats, it was also seeded down to clover and some timothy, and if the sod was plowed under before it had run out, the humus supply would have been maintained and very good results realized the next time the practice was repeated. Even at that we must strongly emphasize the importance of feeding the extra fodder grown to stock and of ultimately trying to get some of the manure produced back on this field.

If one would get the biggest results so far as farm improvement is concerned, from the application of fertilizer, he will use his fertilizer to help him in growing bigger crops of turnips or mangels or corn etc. to feed the live stock. In this way he can keep more head of livestock in better condition and hence he will have more profits and more manure and so gradually build up the farm.

3. Can we get on without potash?

Ans. In an article on Commercial fertilizers published by this department in 1909, long before the war, it was stated (see page 92 part 2 report of Secretary for Agriculture 1909) "On the College Farm, perhaps because nothing but live stock produce is sold and moreover the liquid part of the manure is not allowed to leach away, we have, up to date, received very indifferent returns from the application of potash." Continuing, we recommended every farmer to experiment for himself and personally ascertain whether potash did pay on his farm.

Four fifths of the potash in barn yard manure is in the liquid part. On farms, therefore, where the liquid manure is carefully conserved, potash is not needed so much as on farms where it is wasted. Besides Mr. Harlow's chemical analyses indicate that in no single element are Nova Scotia soils in general so well supplied as in potash. The only trouble is that the potash is in an unsoluble condition. Frequent cultivation and the good results from incorporating humus in the soil will help to set this potash free. Finally, it has been found that lime to a considerable extent and also nitrate of soda will help to set free the latent store of potash. Hence, where good farming is followed and liquid manure properly conserved and where there is either naturally present or artifically applied sufficient lime to help set free potash and cause a good supply of humus especially from clover, we are sure that potash starvation will not occur for many years—how many years we do not know. The first crop to show the loss of potash will be potatoes.

4. Is limestone a valuable fertilizer?

Ans. So far as plant food is concerned limestone supplies calcium an essential element of plant food. It so happens, however, that in practically every soil there is always present sufficient calcium for this purpose. However, lime in addition will correct the sourness (acidity) of soils, and recent investigations have indicated that upwards of 90% of Nova Scotia soils are more or less acid. Besides lime will stimulate a soil to give up some of its insoluble potash and nitrogen, and from this standpoint may be classed as a stimulant which will only give results when there is a reasonable supply of these elements present. Also lime improves the physical texture of all kinds of soils causing them to hold moisture better as well as to retain plant food in more available conditions. From all this, it will be seen that lime is more of the nature of a corrective than of a direct plant food. By actual experiment we have found that lime added to a poor soil has given very little results, but when added to a soil fairly rich in humus and other plant food constituents it has given good results, especially with clover. Further we have found that, in the case of the poor soil, when lime has been added along with the commercial fertilizers or barnyard manure better results, by considerable have resulted especially with clover than when the commercial fertilizers and manure have been applied alone. This will help to explain why some farmers report no results from the application of lime and others report good results. One may apply lime either in its burnt form or in the form of ground rock. We strongly recommend the latter because it has given at least as good results in our experiments, frequently better, and it does not burn up the humus supply as does quicklime.

The one crop on which we have observed big results from the application of lime is clover and there is no doubt that where the application of lime causes a better growth of clover, the foundation is laid for a more productive soil. —See subsequent article on "Lime in its Relation to Agriculture."

5. Is Gypsum or ground plaster a fertilizer?

Ans. Gypsum will not sweeten the soil; in fact it has rather the opposite tendancy. Nor it is a direct plant food However, Gypsum will to some extent stimulate a soil to yield up its potash and other plant food elements. It will also slightly improve the texture of most soils. In such countries as in the south where the moisture supply is very deficient, gypsum will help to improve the moisture holding qualities of the soil and so cause it to produce bigger crops. If one could buy gypsum very cheaply it could be advantageously spread over manure heaps to prevent the escape of ammonia. The usual small application applied for this purpose accomplishes almost nothing but a heavy application would be useful. The best use tnat gypsum can be put to, when used in small quantities, is for sprinkling the floor of stables to keep them sweet and clean.

6. Should fertilizers be broadcast or sown in drills for such crops as potatoes, turnips etc?

Ans. Where a sufficiently heavy application, say 800 lbs. or over per acre is used, we strongly recommend broadcasting, but where only a small application is used to supplement barn-yard manure with a view to supplying the early demands of the crops we would recommend sowing in drills.

If one will take the trouble to examine carefully the soil of a potato or turnip field, he will find that the rootlets spread over all the ground and so secure their food not merely right under the stems of the plants but over the whole area of the land. The only time when the feeding area is confined to the rows is when the plants are small. A knowledge of this fact should govern one's practice in accordance with the foregoing statements. Heavy applications in the drill are dangerous because of the injurious effects on the tender rootlets of the plant; therefore when heavy applications are necessary broad-casting should be the invariable rule. A strong objection to fertilizing in the drill is the uneven crop which will be grown in succeeding years whether it be oats or clover etc. Frequently we have observed the location of the original rows clearly marked by the character of growth in the hay field two years subsequently. Best practice now favors broad-casting.

7. Which crops pay best for fertilizer applications?

If one applies fertilizer to potatoes or turnips or any hoed crops, he will usually get big returns that will more than pay for the cost of application to these crops and besides in the following year he can sow the field to oats or another cereal and seed down with clover and timothy with equally good results (in fact generally better) than if the fertilizer had been applied directly to these crops. It is difficult to make very big profits on fertilizer applied direct to oats and hay.

8. Does fertilizer lose value by being stored for a year or more?

Ans. Factory mixed fertilizers will not lose value unless the fertilizers become damp and cake to such an extent that they cannot be applied to the soil advantageously. When kept in a dry place no such trouble should occur. Home mixed fertilizers are much more likely to cake than factory mixed fertilizers and should by all means be applied as soon as possible after they are mixed. In neither case will there be a loss of the fertilizing constituents.

9. Does it pay to use fertilizers to supplement barn yard manure?

Ans. In no case have we had bigger returns from a certain amount of commercial fertilizer than when we have used the same to supplement an application of barn yard manure for the purpose of growing turnips and other hoed crops. It is far better practice to divide the manure and the fertilizer reasonably over a given number of fields than to apply all the manure to one or more fields and all the fertilizer to other fields.

10. Which pay best, high or low grade fertilizers?

Ans. By all odds high grade fertilizers. The seeming cheapness of low grade fertilizers is apparent not real. In order to make a low grade fertilizer it is necessary either to use a considerable amount of inert slow acting material or to use a considerable amount of some such filler as dust, dried swamp muck, ground limestone, gypsum, etc.. It is poor business paying freight on these useless substances. If one will take the pains to study the directions given in the preceding article, he will find that a unit of plant food is always bought considerably cheaper in a high grade than in a low grade fertilizer. The only reason why manufactur:-ers make up low grade fertilizers is that their clients are bound to buy something that seems to be cheap even if it is not cheap.

11. Can a farmer, who has not a knowledge of chemistry learn how to value fertilizers?

Ans. Yes. The person, who carefully studies the foregoing article and can according to directions calculate from current market prices what a pound of nitrogen, phosphoric acid, or potash cost him, should easily apply these figures to the figures on the tag attached to the fertilizer bag and so calculate the relative values in dollars and cents of each brand of fertilizer. If a farmer is really interested it will pay him, in the winter time to organize a little club and get some student from an Agricultural College or one of his neighbors who has studied the business to explain the process of calculation which is really very simple when once it is grasped and then he will know just what he is doing when he buys a bag of fertilizer.

12. Should fertilizers be applied to the surface and there allowed to soak in or should they be worked in?

Ans. Practically all fertilizers should be lightly harrowed in. They should not, however, be turned under too deeply say not more than 2 to 4 inches. About the only fertilizer which can be advantageously applied to the surface is nitrate of soda which is very soluble and which is often applied by gardeners from time to time during the summer after the plants have come up. At the same time fertilizer applied to the surface, as for example on grass lands, will be gradually washed in. No loss will occur, but the results will be a little slower.

13. Does it pay to apply fertilizer to a poor soil?

Ans. In no sphere is it truer that "To him that hath shall be given" than in the sphere of agriculture. Fertilizers give the best results on soils that are at least moderately rich. It is especially important that they should contain a reasonable amount of humus. We have seen fertilizer applied to poor soil on which it was intended to sow oats and seed down and we have seen the farmer fail get enough back to pay for the cost of the application. If one would get most profitable returns from fertilizers on poor ground he should either apply them along with a little barn yard manure or, if that is impossible, first plow under some such green crop as buckwheat or rye which is necessary to supply the humus essential to the best returns from any fertilizer.

14. Do heavy applications of commercial fertilizer pay or is it more economical to use light applications?

Ans. In a subsequent article on the potato growing methods of Mr. Veinotte of Lunenburg County it is stated that he used 1600 lbs. per acre of a fertilizer mixture which cost him $42 per ton. But the result was a 500 bushel crop of potatoes. No doubt many, who read this article and who have used about half that much fertilizer, would consider themselves well repaid by a 250 bushel crop of potatoes. The extra 250 bushels would pay for from two to three tons more of this high priced fertilizer. On the other hand, when one is applying fertilizer to such a crop as hay, or oats, which at best will only produce from $20.00 to $50.00 worth per acre, he cannot possibly afford to spend very much money on fertilizers. The careful farmer will keep account with his fields and will soon learn what is the maximum amount of money he can afford to spend per acre for fertilizer for a certain crop.

15. Is Basic Slag a complete fertilizer?

Ans. No. A complete fertilizer should contain the three essential elements of plant food, nitrogen, phosphoric acid, and potash. Basic Slag contains only phosphoric acid. It, however, happens that Basic Slag is an extra good fertilizer to encourage the growth of clover and clover, as is well known takes nitrogen from the air and adds it to the soil. Besides the presence of the extra humus from a clover sod combined with extra cultivation will help to set free some potash which exists in an inert condition in the soil. It therefore happens that such a fertilizer as Basic Slag when combined with a good rotation of crops and thorough cultivation will often give nearly as good as and more economical returns than a complete fertilizer.

16. Is Bone Meal a complete fertilizer?

Ans. No. Bone Meal contains nitrogen and phosphoric acid and is only lacking in the third of the essential elements of plant food, potash. Since potash is often present in large quantities in the soil as explained in the foregoing, and since Bone Meal may also be used to encourage the growth of clover, it is frequently possible for bone meal to give almost as good results at less expense than a complete fertilizer. It should, however be remembered that the plant food in bone meal is not in a very soluble condition and that as a result bone meal only gives good returns on lands fairly rich in humus. The whole question is discussed in the paragraph dealing with bone meal in the preceding article.

17. If a farmer plans to mix fertilizers at home how can he buy to advantage the chemical ingredients necessary?

Ans. For mixing fertilizers at home the farmer should have, nitrate of soda, acid phosphate, muriate of potash, and he may also mix in bone meal, basic slag, or in fact almost any fertilizing substance. The difficulty is that, whereas the trade supplies mixed fertilizers all over the country, it does not to the same extent supply the separate substances. If a farmer, by himself, wishes to mix fertilizer it will cost him so much for the freight on the few bags of chemicals he buys that any possible profits are likely to be lost. This problem is now being solved in several parts of the Maritime Provinces by farmers purchasing their chemicals co-operatively. Incidentally co-operation will help to solve a good many other troubles with which the farmer is confronted.

18. Is there any Legislation in regard to the selling of fertilizers in Canada?

Ans. There is no Provincial Act but there is a Dominion Act entitled "The Fertilizer's Act of 1909" which is administered by the Department of Inland Revenue. According to this Act, all fertilizers offered for sale must bear a registration number which is granted to the manufacturer by the Inland Revenue Department on formal application. Every package of fertilizer should have affixed to it a printed tag or label giving the following information

1. Name of brand.
2. Registration number.
3. Name and address of manufacturer.
4. Analysis, as guaranteed by the manufacturer.

Any purchaser of a registered fertilizer may have an analysis made by the Inland Revenue Department, Ottawa for the fee of $1.00. Should the fertilizer be found of less value than guaranteed, the manufacturer is liable to a penalty, and the purchaser has a basis for civil action to recover damages. For the purpose of such analysis the purchaser must submit a sample of at least 2 lbs. weight to be enclosed in glass jars or bottles and properly sealed. The samples must be taken in the presence of the vendor or his representative. In lots of 5 tons or less portions shall be drawn for each separate package and from at least ten packages; or if less than ten packages are present, all shall be sampled. In lots over 5 tons, at least 10% of the packages shall be sampled. The portions so taken shall be thoroughly mixed in the presence of the parties interested and from this mixture the sample sent to the Minister shall be taken; and must bear the signature of vendor and purchaser; and at the same time a duplicate sample is to be left with the parties whose goods are inspected, subject to the call of the manufacturer or agent.

19. Are there any duties on fertilizers?

Ans. All fertilizers whether dutiable or not are exempted from the special extra war tax.

Compounded or manufactured fertilizers are levied a duty of 5% when imported from England and of 10% when imported from other countries. This class includes all mixed fertilizers, also Basic Slag, Acid Phosphate, Sulphate of Ammonia, Nitrate of Soda, Muriate of Potash and Sulphate of Potash.

Uncompounded fertilizers (what might be termed raw goods) are exempted from all duties. These include Phosphate Rock, Kainite, Crude German Potash Salts, Bone Meal, Charred Bone, Bone Ash, Fish Offal or refuse and other mineral and vegetable manure.

The underlying principle of this tariff is that fertilizer manufacturers in Canada are protected by a duty on manufactured fertilizers of a 5% preferential tariff on English goods and a 10% tariff on goods imported from other countries. All crude raw or unmanufactured fertilizers may be imported duty free by manufacturer and farmer alike.

20. What is meant by such a description as 4-8-4 mixture?

Ans. This means a mixed fertilizer which contains:

4% ammonia—3.3 nitrogen.
8% soluble phosphoric acid.
4% potash.
that is a ton ot 4-8-4 fertilizer would contain:
80 lbs. ammonia.
160 " soluble phosphoric acid.
80 " potash.

21. How could you at home make up a 4-8-4 mixture?

Ans. Supposing one had available nitrate of soda containing 15% nitrogen which is equal to 18% ammonia; 14% acid phosphate; and 50% muriate of potash he knows that by putting into a mixture:

100 lbs. of nitrate of soda he will contribute 18 lbs. ammonia.

100 lbs. acid phosphate he will contribute 14 lbs. soluble phosphoric acid.

100 lbs. muriate of potash he will contribute 50 lb. potash.

Therefore

to add 80 lbs. ammonia use $\frac{100 \times 80}{18}$, = 444 lbs.
nitrate of soda.
to add 160 lbs. phosphoric acid use $\frac{100 \times 160}{14}$, = 1143lbs.
acid phosphate
to add 80 lbs. potash use $\frac{80 \times 100}{50}$ = 160 lbs.
muriate of potash.
Total 1747 lbs.

The person who makes this mixture will have 1747 lbs. of fertilizer containing as much plant food as 1 ton (2000 lbs.) of a 4-8-4 mixture. If he wishes to bring his mixture up to the same weight he can make up the difference with ground gypsum or lime stone or for that matter road dust, but the best method would be to apply to the land proportionately smaller amounts of the 1747 lbs. mixture. Other substances such as bone meal, blood meal, fish fertilizer, or even basic slag may be introduced into such a mixture and it is only a question of arithmetic just as in the foregoing to calculate exactly the percentages of nitrogen, phosphoric acid and potash which the mixture will contain per ton. The calculation is not difficult and the process is being used on an increasing number of farms every year.

LIME IN RELATION TO AGRICULTURE

By L. C. Harlow.

Agricultural literature is full of such statements as; "Limestone is the mother of fertility;" "Limestone soils are rich soils;" "Lime is the basis of all good husbandry;" "Lime is the most valuable and most extensively used of all the mineral substances that have been made available in practical agriculture."

These statements are facts which are not only deduced from the results of innumerable applications of this substance to lands of every quality, but are established by a consideration of the known chemical composition of soils which are naturally possessed of unlike degrees of fertility.

As illustrations of the effect of adding lime take the following:—

First. Any roadside or railway siding where limestone has been handled shows very often, a rich growth of clover.

Second. The result of an experiment on the College Farm, Truro.

Data supplied by Prof. Trueman.

The limestone was applied to the land at the rate of four tons per acre when the wheat was sown in the spring of 1914. The clover grew well in the fall of 1914, and in the spring showed no evidences of having been winter killed. The clover hay was cut on July 13th and hauled in, in good condition. The results were as follows:

Plot	*Treatment*	*Wt. of Hay*	*Size*	
No. 1	1a....unlimed	2550 lbs.	½ A.	1 Acre
	1b....limed	3610 "	½ A.	
No. 2	2a....unlimed	2570 "	½ A.	1 Acre
	2b....limed	3090 "	½ A.	
No. 4	3a....unlimed	1160 "	¼ A.	½ Acre
	3b....limed	1490 "	¼ A.	
No. 5	4a....unlimed	1150 "	¼ A	½ Acre
	4b ...limed	2010 "	¼ A.	

Or 1½ acres unlimed produced 7430 lbs.
1½ acres limed produced 10000 lbs.
A gain of 2570 lbs.

Third. The results of an experiment on a New York state farm which had become so poor that the owner had lost it.

Treatment.	*Unlimed.*	*Limed.*
Nothing	1824	3852
Potash and phosphoric acid	2349	4174
Potash, phosphoric acid and Nitrogen	2235	4085
15 tons manure	2091	4976

Not only was the hay yield increased but the limed plots showed much timothy, while only red top grew with the clover on the unlimed plots.

Fourth. In Ohio a five years rotation of corn, oats, wheat, clover and timothy showed the following financial returns:—

	no lime	lime
Total value of crops per acre unfertilized..	$49.40	$61.40
Total value of crops with fertilizer of nitrogen, phosphoric acid and potash..	80.04	104.15

Fifth. In Illinois, ground limestone, applied five years before, increased the crop yields per acre by 12.5 bushels of corn, by 6.9 bushels of wheat and by 1.1 tons of good clover hay. The value of these increases amount to $15.87 with much of the limestone still in the soil.

Sixth. Indiana reports out of 46 plots where lime was used, 18 showed a sufficient increase of corn and wheat yield to make profitable the use of lime. In nearly all cases these were single year experiments.

Seventh. New Hampshire says that in a series of 15 experiments on grass plots lime has not increased the yield; that on a series of grass plots on clay soil lime has been used at a loss.

Director Thorne of the Ohio Experiment Station, after twenty years of work experimenting with lime, says "That on soils deficient in lime it is as necessary to make good this deficiency as it is to make good that of nitrogen, potash or phosphoric acid."

The following shows the amounts of lime and organic matter in a number of soils of Nova Scotia:—

	Lime	organic matter
Cultivated field, Sydney....................	.3	7.95
Muck soil, West Bay, Ant. Co..............	.45	66.15
Cultivated field, Ant. Co.	.6	6.3
Muck soil, Inverness Co....................	1.4	7.65
Sub-soil, red sandstone soil, Truro...........	.15	1.4
Surface, red sandstone soil, Truro............	.3	6.
Soil near limestone, Pugwash, Cum. Co.......	1.3	6.
Average of 16 marsh soils..................	.75	6.7
" 10 upland soils	.3	10.
" 14 soils from different parts of N. S. virgin and cultivated..............	.25	10.3
Limestone rock soil, Hants Co...............	.4	6.25
Clayey sub-soil, Middleton, Anna. Co.........	1.8	5.3
Sandy meadow Soil, Middleton Anna. Co.,..	1.8	3.15
Black meadow soil, Berwick, Kings Co........	3.4	59.85
Bare, sandy soil, Kings Co..................	.025	3.63
Cultivated land, Digby Co...................	.3	11.12
Average of 200 fertile United States soils......	2.16	7.00

There are wide variations in the lime content of our soils; the rich marsh soils and the meadow soils have quite large amounts of this element. The question is, to what extent is lime needed? It is true, no doubt, from the illustrations cited that the profitable use of lime depends upon the soil and the crops grown upon it.

From the fact that every province of Canada and every state of the union is conducting experiments with lime and that many companies are promoting its use there appears to be no more live question concerning soil fertility and crop returns than that of lime and its compounds.

The Source of Lime.

Originally lime is found in rocks like trap and granite of which it forms 1.32 per cent, in some cases. These rocks by various agencies form a rock, gneiss, quite common in Nova Scotia which contains 3.17 per cent. of lime; the peculiar fact is that the soil from this rock may have only a trace of lime. This shows that even with such durable rocks as these, the limestone is leached from the soil. Such a purely *mineral* soil might have from 0—60000 lbs. of lime per acre, six inches deep. Nova Scotia soils will average about 6000 lbs. per acre.

What is Lime?

Strictly lime, burnt lime or lump lime, is the oxide of calcium, a substance not found in nature but manufactured from minerals like limestone, chalk, marl, marble, substances to which the name lime is commonly applied.

The soil is a complex mass of substances, each of which is made up of at least two parts, one from each of the following groups. One group has basic properties with a sweetening or alkaline effect; the other, has acid properties and usually is spoken of as sour.

To the first Group belong basic substances.	*To the second Group the acids.*
Soda	Carbonic.
Potash	Sulphuric.
Lime	Phosphoric.
Magnesia	Silicic
	Nitric.
	humic and many other organic acids.

These alkaline and acid substances unite to form neutral substances or salts: for example, lime unites with carbonic acid to form limestone, with sulphuric acid to form gypsum, with phosphoric acid to form bone phosphate.

As a rule, if the soil be made up of such compounds, it is neutral; if the bases or basic salts exceed the acid it is alkaline; if the acid material predominates then the soil is sour.

Before discussing the function of lime it is very important to recognize that lime, in an average soil, is held by a number of the acids, the compounds resulting from such unions being soluble in some cases and quite insoluble in others; thus if a soil analyzes .3 per cent. of lime, there may be .05 per cent lime in each of gypsum, limestone, lime phosphate and silicate, with .1 per cent. combined with the organic acids to form humus. Now the lime in these forms has different functions, giving with the same total per cent. of lime a variety of soils depending on the combinations of lime in the soil.

Agricultural lime is the term applied to lime and its several compounds which are found in sufficient quantities to be of use and which are capable of performing the functions to be dealt with later.

In Nova Scotia there are several forms of lime which may be used.

Natural.	*Manufactured.*
Limestone	Ground limestone
Marble	Burnt lime.
Oyster and clam shells	Water slaked lime.
Marl	Air slaked lime.
Gypsum	Wood ashes.
	Basic slag.

Limestone is the basis of most agricultural limes; its value depends upon the amount of carbonate of lime; there are often impurities such as silica, iron, alumina. Carbonate of magnesia is often present but, since this material will correct bad conditions in the soil and supply magnesia as a food, if the soil lacks that element, it need not be considered an impurity.

Marl is a fine grained, loose, friable material, grayish in color and of different textures; it is composed of carbonate of lime with varying amounts of the same impurities as are found in the limestone. Limestone is distributed all through the northern half of the province while the marl deposits are found in the eastern counties as Antigonish and Inverness.

The following table gives the chemical analysis of a few limestones and marls.

	Insoluble.	Carbonate of Lime.	Iron mognesia etc.
Limestone, Sydney	6.49	91.6	.8
Marl, Antigonish	5.34	93.4	.4
Limestone, Pugwash	11.15	84.82	3.34
Limestone, Port Hood	1.90	98.20	.90
Marl, Port Hood	19.00	80.25	1.36
Limestone, Hants Co.	7.85	89.29	1.26
Marl, Gay's River, Col. Co.	94.65	3.00	2.40
Limestone, Col. Co	4.30	91.00	4.70

Substances suspected to be limestone, it is seen, vary from 3 per cent. carbonate to 98.2 per cent.

The advantages of naturally powdered limestone, the marl, have been so strikingly shown in England as well as in Antigonish in our own Province that for years, especially in the United States, the hard limestone rock has been crushed by the use of machinery. It is this material which has been experimented with so much that its use, in order to give better crops, is now assured. For soil amendment, the limestone must be reduced to a fine powder. Present indications are, that the fineness of the crushed limestone should be at least $\frac{1}{60}$ of an inch in diameter if economical, *immediate* return is desired. For even distribution and for convincing effect, the first year or so, on such crops as clover the finer the limestone the better. Some do not insist on fineness, claiming that it will remain in the soil, longer if not too fine. That this is true is shown by the analysis of a soil on the College Farm.

	Lime per cent.	*Lbs. per acre.*
Fine soil analyzed, no limestone applied	.3 equals	6000
Applied 4 tons limestone per acre but only the fine soil analyzed	.4 equals	8000
Coarse soil analyzed	.6 equals	12000

It is thus seen that most of the ground limestone is in the coarse soil, the last three fractions in the next table. Physical analysis of three samples of limestone will show the cause of probable differences in their effects on the same soil.

	Sydney Ground limestone. I	Antigonish Co. Marl. II	Antigonish Co. Marl. III
Particles	%	%	%
less than $\frac{1}{50}$ in. diameter	25.25	33.	73.8
between $\frac{1}{50}$ in. and $\frac{1}{25}$ in. dam	14.86	15.42	8.03
Between $\frac{1}{25}$ in. and $\frac{1}{12}$ in. diam	30.60	21.37	13.3
over $\frac{1}{12}$ in. diam	29.26	30.2	4.85
	99.97	99.99	99.98

The effect of fineness of the limestone on a crop of wheat is indicated by Plate I.

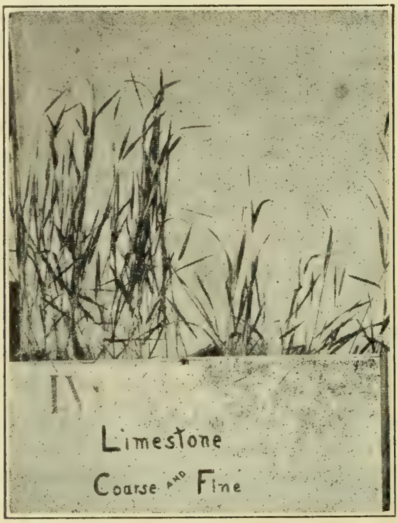


Plate I. Plant on the left treated with fine limestone, on the right with coarse.

A sour soil was treated with nitrate of soda and 2 tons of fine limestone, the first fraction in the above analysis; the soil of the other box had the same treatment except that the coarse part of the limestone was used.

The essential constituent of all these forms of so called lime, is the lime itself. For centuries this material has been prepared from the limestone, composed of lime and carbon di-oxide, by heating it strongly in a kiln and driving out the carbon di-oxide. This is a caustic material, known as *burnt lime,* the strongest form of lime. It quickly does its work in the soil and, because of its strong effect, is often considered to be harmful; 100 lbs. of *limestone* will give 56 lbs. of *lime.*

When water is put on burnt lime or when it is exposed to moist air, an action takes place between the lime and water giving what is known as slaked lime; 56 lbs. of lime will give 74 lbs. of slaked lime. This is less caustic than the quick lime but the 74 lbs. of it will do as good work in the soil as the 56 lbs. of lime.

Burnt lime, exposed to the air for some time takes up water and carbon di-oxide again, and comes back to *air slaked lime,* the same composition as limestone; 56 lbs. of burnt lime will give from 74 to 100 lbs. of air slaked lime, depending upon the amount of moisture and carbon dioxide absorbed from the air.

This is what probably happens to most of the burnt lime put on the soil; limestone is a milder form of lime, slower in its action, but will neutralize the acid and perform the other functions of lime.

Wood ashes have from about 23 to 45 per cent of lime, depending on whether they are from hard or soft wood or a mixture and also whether they have been leached or not.

If a soil needs phosphoric acid as well as lime, basic slag and not acid phosphate might be applied, because it contains 30 per cent. of lime about 12 per cent of which is free lime or the carbonate. Perhaps in some cases the lime, even though in small amounts, does as much good as the phosphoric acid.

Gypsum, found all through this province is lime joined to sulphuric acid; it will provide the lime as a food but cannot correct acidity since the residue of sulphuric acid produced by the taking away of the lime is not volatile like the carbonic from the limestone, but remains in the soil to increase the acid acidity. It is a substance which, for other reasons, as setting free potash, flocculoting clay, etc. is of great value. Lime, either burnt or slacked, and the carbonate of lime because they destroy acid soils, might be called *alive* lime. Gypsum and silicote of lime, etc. on the other hand, are *dead* forms of lime.

What Does Lime do in the Soil.?

The many effects of lime may be considered under the following heads:—

(1) As a direct food.
(2) Physical.
(3) Chemical.
(4) Biological.
(5) Harmful.

(1) *As a direct food*:

The ash of plants contains a large quantity of lime, wood ashes having on an average of 33 per cent.; 200 bushels of potatoes remove 80 lbs. of lime from the soil; 2 tons of clover, also 80 lbs. Such quantities taken up by the plant must be necessary for its life, that is, if the lime be in insufficient quantity in the soil it must be added; in such cases, lime becomes a *direct* fertilizer. About one-sixth of the surface rock of the world is limestone. This mineral is quite easily soluble and so becomes pretty well scattered through the soil. As a consequence, most soils have enough lime for plant food only. There are some sandy and slaty soils which may have too little lime for plant growth, especially if those soils are on hillsides or have been continually cropped or have been treated with much muriate or sulphate of potash, sulphate of ammonia or acid phosphate. The lime taken out of the soil annually may be from 100 to 1000 lbs. per acre foot. These soils are usually deficient in nitrogen, phosphoric acid and potash, which on being supplied, are combined in bone phosphate or basic slag with abundance of lime. Since the plant is able to get lime from any of its several compounds in the soil and since our soils average .3 per cent. lime equal to 6000 lbs. per acre it follows that lime for plant *food* will last some time. There are, nevertheless, a few rare cases where lime would be a *fertilizer*.

(2) *Physical effect of lime.*

Lime is *especially* beneficial on clay soils. It also has its place on sandy soils. The chief objections to the clay soil are in its inability to allow air and water to circulate through it, in its readiness to form hard clods, puddling, that is, separating into its finest particles when cultivated wet. Lime gathers a number of the fine particles into one, a thousand perhaps making one, just as the little snow flakes on a damp day gather into big feathery ones. This is known as flocculation. The results of flocculation are, that the soil allows the water to sink into it more quickly;

in dry weather the ground water can rise better because the soil is more porous; it warms up more quickly in the spring and is much more easily worked. In England where much lime is used on clay soils the farmer says the use of lime enables him to plough with two horses instead of three. Lime for correcting clayey conditions should be applied in the fall. Flocculation may be produced by burnt lime, slaked lime, limestone or gypsum, but the action is more rapid when burnt lime or water slaked lime is used.

Sandy soils do not readily hold water but allow too much air and water to circulate; lime, especially in the form of ground clayey limestone has been found to make a soil more retentive.

(3) *Chemical Effects of Lime.*

The soil is changed in many ways by the action of lime.

(a) It acts as an indirect fertilizer. Plant food of the soil is usually liberated very slowly by water and air action. If there be plenty insoluble food elements in a soil lime sets free quite large amounts. This is especially true of phosphoric acid and potash.

The potash may exist as silicate of potash. The lime takes the place of the potash forming silicate of lime which stays in the soil, the potash being soluble is either leached out or used by the plants. Thus too much lime may exhaust the potash and thus prove the truth of the old saying, "Lime makes rich fathers and poor sons."

Phosphoric acid exists in the soil as phosphate of lime, iron or alumina. These are so insoluble that phosphates leach but very little that is they are unavailable. Now phosphate of lime is somewhat soluble in water containing carbonic acid; the excess of lime in the soil tends to keep the phosphoric acid combined with the lime rather than with the iron or alumina and also to give carbonic acid gas. The result is, that a soil, which has its phosphoric acid combined with iron or alumnia, treated with limestone, shows good amounts of available phosphoric acid.

Again, the soluble acid phosphate by combining with iron and alumina becomes insoluble in a short time, even 24 hours; lime present in excess maintains the solubility of the phosphate.

(b) Just as the air of a room may be vitiated by gases which are harmful for people to breathe so the soil, as a result of plant life, may contain substances which are more or less injurious to plants. Such substances are, certain salts of iron and alumina, various soil acids and some substances of unknown character.

Lime will make insoluble the iron and alumina salts, will neutralize or destroy the acid and produce a "sweetened" condition of the soil. See page 128 for a fuller discussion of this point.

(4) *Lime Affects the living Forms of the Soil.*

a. Bacteria thrive in a mildy alkaline soil; hence, in that condition, those organisms which are attached to the roots of clover flourish, take up the nitrogen of the air, and use it in making organic matter, the so called nodules on the roots of legumes. Since the legumes thrive best when the bacteria are vigorous there is a good yield of clover etc.

(b) The decay of this organic matter, so rich in nitrogen, is bacterial action. Ammonia is the result. Another kind of bacterium changes the ammonia into nitrates, the most useful form of nitrogen. An alkaline condition produced by lime or limestone, will encourage the work of these little organisms.

Not all failures of clover are due to soil acidity; even on a heavy soil, not acid, lack of drainage will kill clover. Lime will flocculate the clay, open it up, allow the air to circulate, a condition favorable to soil bacteria.

(c) Lime changes the vegetation.

A lime soil, as a rule, produces plants which are more compact and sturdy in growth, with denser tops than the lime lacking soils. Grains and grasses on limy soils are less apt to lodge than those grown on soils less rich in this material. Lime seems to be so necessary for some plants that their presence proves the soil to be limy; on the other hand certain other plants are indifferent to lime. Rhode Island Experiment Station has, after years of experiment, classified plants as follows:—

Lime Loving Plants.	*Indifferent to lime*	*Injured by Lime.*
Most legumes as beans, clover and peas................	Apple......	Blackberry
Cabbage.....................	Corn.......	Potato.
Beets.......................	Carrot.....	Radish.
Lettuce.....................	Rye	Sorrels.
Onion.......................	Red Top Grass....	
Pumpkin.....................	Tomato....	
Rhubarb.....................	Oats.......	
Timothy.....................		

(d) Effect on plant diseases and pests. Potatoes are apt to be scabby on soil which has been limed provided the seed or the soil are infected. Lime, of itself, cannot cause scab; potatoes show often, increased yield on limed land. Why then is lime hurtful to the potato? The fungus growth, known as scab, thrives in alkali soils; the potato is the host plant hence the potato is injured indirectly by lime.

Club root in turnips and cabbage, is checked by the use of lime. A good illustration of this is cited by Prof. Andrews, formerly of Mt. Allison University.

"Some cabbage plants were taken from a garden, in which club root was common, to a new garden. In midsummer, one after another of the cabbage began to wilt down when the sun was hot, and there was little hope of saving any. A mixture of iron filings from the foundry and lime thrown on the surface of the soil close to the plants was tried, with the result that the spread of the disease was checked, and only four heads in a hundred were lost. When the cabbages were harvested, they were of good size and quality, but not one was found which, had not through disease, lost its main root, and near the surface, under the iron and lime were mats of fine roots, which had carried the crop through."

Soil Acidity.

Judging the soil by the test with litmus we must conclude that the soils of this province are acid, with few exceptions. This test is made by taking a handful of soil in a cup; moisen with rain water to a thick paste; allow to stand a few minutes; then, with a knife, open the soil and put in the end of a strip of blue litmus paper. Press the soil around the paper and leave for five minutes. If the paper, after removal, remains blue it is not acid; if it plainly turns red it is acid. The fingers must not touch the end of the paper used in making the test.

Over 200 samples of soils of different types, heavy and light, humus soils and those lacking in humus, from all parts of the Province have been so tested with the result that about ten out of this number did not show a decided acid reaction.

There are various causes given for this acid condition:—

(1) On marshes the decay of organic matter changes the sulphates to sulphides, which give an acid reaction.

(2) The continued use of certain fertilizers as muriate of potash, acid phosphate. The former consists of potash and hydrochloric acid. When the plant uses the potash the acid remains to be added to the next year, unless some base neutralizes it.

(3) Decay of organic matter usually results in the forming of acids; for example apple juice fermenting, which is a process of decay, produces vinegar; milk souring gives lactic acid; the vegetable material of the soil gives the humic and many other soil acids. No doubt this is one of the chief causes of sour soils.

Limestone is Nature's corrective for such conditions which are inimical to many of our crops, and which are so common to our soils. The same action, though less vigorous, takes place when limestone is put on a sour soil as occurs when vinegar is put on soda. The acid part, carbon di-oxide of the carbonate passes off into the air, the free acid of the soil joins the base part that is the lime, forming a substance with no acid action; thus a soil is sweetened.

Various methods for finding the amount of lime needed have been suggested. These methods give results which differ. Several soils have been tested for "lime requirement" with results as follows:—

	Amount of 90 *per cent. carbonate of lime to neutralize the acid.*	
Pugwash, soil near limestone	172.	lbs.
Merigomish, Pictou Co.	2.88	tons
" hillside	3.	"
" intervale	2.6	"
Annapolis Co. soil (meadow)	14.	"
" " "	24.	"
Muck soil, Sydney	43.	"
Hants Co. Selma	1.7	"
Truro slaty soil	3.	"

Aside from the muck and meadow soils the amount of limestone required is about 2½ tons per acre. If burnt lime were used about 1½ tons per acre would do the same work.

With all the functions that lime performs in the soil, it seems quite reasonable to find such statements as the following:—

Director Thorne of Ohio says in Circular 79; "When the land begins to need lime it is a waste of time, energy and money to continue cultivating it until this need is supplied, for the economical use of every other fertilizing material, including manure, depends upon the lime supplv. If that is deficient everything else must fall short of its possible attainment."

What form of lime is best to use?

Years ago in Nova Scotia, when many farmers had their own lime-kiln, burnt lime was used in large quantities. The beneficial effect of liming, showing in some cases as long as thirty years seems to have been forgotten and only here and there lime, in any form, has of late, been used by farmers.

A lime campaign seems to be sweeping over the country and we face the above question with more scientific facts to help us in answering it.

Soil, crop, climate, location, season of application, price, means of application and total cost all enter in to affect the choice. Pennsylvania Experinent Station in a series of experiments, in a four year rotation, covering twenty years, compared lime with ground limestone with results as follows:—

Soil Treatment.	Corn 20 years.	Oats 20 years.	Wheat '20 years.	Hay 19 years
	bu	bu	bu	tons
No lime..................	819	678	279	24.9
Slacked lime..............	699	617	318	23.6
Ground limestone.........	798	733	331	29.2

2 tons per acre of the burnt lime, slaked before using was added every 4 years.

2 tons of ground limestone were added every two years. Four sets of plots were used so that a crop of each plant was obtained every year.

Limestone not only gave the best yield but also left 375 lbs. more nitrogen in the soil for the use of future crops. This demonstrates what is considered to be a strong feature in the use of limestone. It is mild and does not use up the organic matter as burnt lime does.. The following summary from Bulletin 160 Vermont is a good answer to our question.

"For heavy soils for the improvement of their mechanical condition; burnt or slaked lime.

For light soils; ground limestone or marl.

For stable use in fixing ammonia; gypsum.

To get the most for the dollar; quick lime.

To use in the fall; burnt lime, slaked lime, carbonate or gypsum.

To use in the spring, carbonate of lime or sulphate, that is gypsum.

To spread the easiest; carbonate or sulphate.

To cause the most discomfort to man or beast; the oxid.

All things considered, economy, ease of handling and service; the burnt lime slaked at the farm fall spread with special spreader."

At present burnt St. John lime for building purposes may be obtained in Truro for about $12 a ton. Ground limestone is costing at the mill about $3.50 per ton., a price which will be lowered as soon as there is a bigger consumption; freight would bring it up to about $4.50 or $5.

Two tons of limestone are equal to about one ton of burnt lime. This gives some advantage in favor of the ground limestone.

Home burning of lime would bring the cost down very much. No doubt the price of fuel and labor in Nova Scotia at present will make burnt lime cost much more than it did 25 years ago.

Does it pay to lime the soil?

There is no doubt about whether there is increased production on most soils. The question then is, does the increased yield cover all the expenses? Take the second example on page 118 $1\frac{1}{4}$ tons gain in clover is worth $13; 6 tons of limestone were applied to the acre and one half; at a cost of $4 per ton for a minimum, this would mean $24. This means a loss for the season of $11. A large part of the stone remains in the soil doing its work for 4 or 5 years. A great deal depends upon the price of the material. As far as this province is concerned the use of limestone is just beginning; as a consequence there are no figures available covering a rotation and not much demand or co-operation both of which will bring down the price. A few figures from New York State might give an idea of the prevailing prices elsewhere.

1 ton of burned lime at railroad station cost $4.00, equals 3570 lbs. limestone $7.14.

Hauling burned lime from station $1.00, hauling limestone $1.78.

Cost of slaking and applying lime $2.50, applying limestone $1.33.

Cost per acre lime is $7.50, limestone is $10.25.

Freight rates and cost of raw material in that state make limestone very high.

In Ohio and Pennsylvania ground limestone is put on the cars for $1.00 to $1.50 per ton.

In Virginia it is said that unless the ground limestone can be put on the farm for $1.75 per ton it will pay better to use burnt lime.

Can lime *alone* restore the fertility of worn out lands which are so common in Nova Scotia?

No; the first step in the process is to add lime in some form *to correct acidity*. Then, some nitrogen and phosphorus in available form as nitrate of soda, acid phosphate or slag and perhaps some potassium. This will give the third of the plants nitrogen which comes from the soil the other two thirds coming from the air in the case of legumes as clover. If the clover be turned under the soil is benefitted in many ways. By the decay, the expensive nitrogen, two thirds of which came from the air, is made available. The potassium and phosphorus soil supply is not increased but is made again available as soon as the clover decays. So many speak of limestone as a fertilizer, thinking it will replace some of the elements, nitrogen, phosphorus or potash that too much emphasis cannot be put on the statement, that lime *alone* can never restore a worn out soil.

How much lime should be added?

Much depends on the kind of soil, the amount of acid present, the purity of the material, fineness of material, nature of crop and whether quick improvement is expected. About 2 tons per acre will be sufficient for the average soil provided the stone is finely pulverized and well mixed with the soil. About half of the rain that soaks into the land is brought up to the surface again by capillarity. This water brings up acid from the sub-soil which must be neutralized by a store of limestone in the surface soil. Hopkins advises about 3 tons per acre every 5 years. Sandy soils need less than heavy soils.

Plate II shows the effect of limestone in different amounts on a sour, sandy soil..

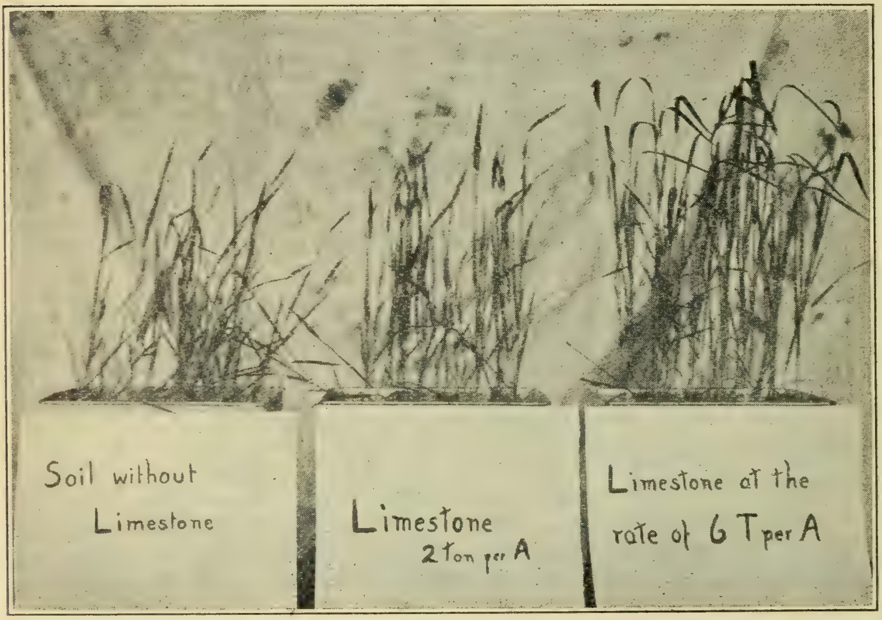


Plate II.

Time to apply lime?

Any form of lime should be applied previous to planting the crop which is to receive the benefit of liming. It should be applied to plowed land and well harrowed in. For clay soils, fall applications are best as a rule while spring is the most natural for sandy soils. Convenience in doing this work is to be considered. It should be done when the ground is dry and roads good; on this basis summer or fall would be best.

How to apply?

If burnt lime is used it is put in piles in the field, 5 gallons of water poured over each bushel of lime, then the pile covered with moist earth. After a few days the lime, after being screened, may be applied with a lime spreader. If a spreader is not available put 25 piles, of one bushel each, per acre, slake it with water or moist earth and spread with a shovel.

Limestone may be applied from a fertilizer distributer, grain drill or from piles with a shovel.

A question on which there is a difference of opinion is, Should lime be added with stable manure?

All do agree in not adding burnt lime with manure because it sets free so much nitrogen or ammonia. Limestone being mild in its action does not set free nitrogen.

Hence many persons, with years of experience, advocate putting the two on at the same time with the manure spreader. An example of this point is shown (1) in the third illustration page 118 at the first of this article; (2) in pot experiments with wheat on a sandy soil, plate III.

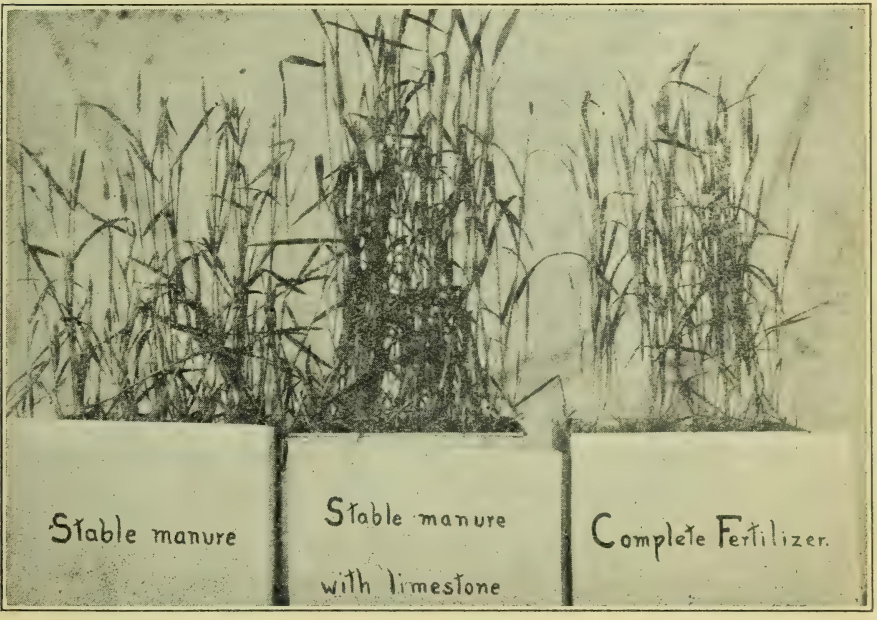


Plate III.—Compare the growth with Plate II. where the same soil is used but with no fertilizer.

Summary.

1. Limey soils are rich soils.
2. Nova Scotia soils are deficient in lime, available phosphoric acid and organic matter.
3. Lime benefits the soil in *many* ways.
4. Lime, in most of our soils, is especially needed for correcting *soil acidity.*
5. Lime exists in many forms, the *lively*, which is either the burnt or the carbonate and the *lifeless*, in gypsum, silicate or organic matter. The former, only, destroys soil acids.
6. Rarely is lime needed as a fertilizer because the lifeless forms supply enough for plant food.
7. Plants are divided into two classes—lime loving and lime avoiding plants.
8. The lively forms must be supplied, as a rule, for growing clovers, and for their decay, when plowed under.
9. Lime heavy soils in the fall; sandy soils in the fall or spring.
10. Lime must be *in* the soil not on it.
11. On a poor soil, supply lime, phosphoric acid and often a little potash to get clover started.
12. Nova Scotia has abundance of limestone. This must be finely ground or burnt.
13. The price is now quite high on account of not much demand and high freight rates.
14. Lower prices will be obtained by testing its usefulness on a small scale, creating a demand and by co-operation among the farmers.
15. Lime added to a soil may aid in solving the present potash problem.

ROTATION OF CROPS.

John M. Trueman.

There are several reasons why a system of crop rotation should be followed on the general farm. The most important advantages to be gained are as follows:—

First—The fertility of the land, that is its ability to raise large crops, can be maintained with smaller applications of plant food to the soil. If one crop is grown on the same land year after year the particular elements most needed by that crop become exhausted, or must be replaced in large quantities. Other elements not so largely used may be wasted at the same time. If different crops follow each other, a more even demand is made upon the plant food in the soil., and therefore fertility is more easily maintained.

Second—The frequent use of legunimous crops adds materially to the nitrogen content of the soil; a rotation is the only praccical way in which Red and Alsike clovers can be used for the purpose of gathering nitrogen. By introducing these clovers and other legunimous crops into the rotation at frequent intervals large amounts of this expensive element are added to the soil.

Third—Gives opportunity to clear the land of diseases and insect pests peculiar to one crop. If, for instance, potatoes were grown on the same land year after year they may become "scabby" and the only known method of escaping this disease is to move the crop to clean land and grow on the infected land crops that are not troubled by the "potato scab."

Fourth—Gives opportunity for frequent working of the soil. This point refers to the common practice of leaving the land in grass for hay for many years Of course if potatoes or other root crops are grown continuously the land can be worked every year. If however, hay is cut on ordinary land for a number of years the soil becomes hard, and the humus content is seriously depleted. Using a short rotation gives the farmer a chance to improve the texture and add humus to the soil by cultivation and by plowing down barn yard manure and green crops.

Two rotations are commonly used in Nova Scotia. 1st, a four year rotation that can only be used on a few farms where a relatively large amount of roots are grown.

1st. year (following grass)		roots; turnips, mangels, potatoes, etc.
2nd	"	grain; oats, wheat, barley, etc.
3rd	"	hay; clover, timothy, red top.
4th	"	" " "

The fifth year go back again to roots. This makes what is known as a four year rotation. Barn yard manure and commercial fertilizers are applied to the soil when preparing it for the turnip crop.

In order to make this rotation a success the grass land must be plowed early in the summer in order to give the sod a chance to rot before winter; otherwise the land will be rough and "soddy" the next spring and it will be very difficult to get it in the proper tilth for turnips. If the grass land is plowed soon after the hay is cut in August and rolled down tight with a heavy roller, and then harrowed, the warmth and moisture of August and September will rot the sod, and the land may be plowed deeply again in October or November and left rough to secure the best results from the action of frost.

The extra good cultivation given the turnips puts the soil in fine condition for sowing grain and seeding down with clover and timothy. One crop of grain and two crops of hay can be grown without the addition of any more fertilizing material. If the first hay crop indicates that the soil is not rich enough to raise two full crops of hay the grass land should be top-dressed, using the manure spreader to do good work.

Where it is not possible to raise so many turnips as would be required if one-quarter of the cultivated land was given up to this crop every year, a five or six years rotation may be used.

Six year rotation:—

In this case follow grass with grain or silage crop and then follow grain with roots and then go on as in the four year ratation.

1st. year oats or corn, or oats, peas and vetch.
2nd. year roots.
3rd. year grain.
4th. year hay.
5th. year hay.
6th year hay or pasture.

This rotation allows the farmer to raise more grain and less roots, as must be done on the majority of farms.

The first year after grass may be devoted to several different crops to prepare the land properly for roots. The most common practice is to raise oats for grain, and this is no doubt a good plan on many farms. On the College Farm we find it works well to raise corn, or oats and peas for putting in the silo at this point in the rotation, as well as some green feed for the cows when the pasture gets short in July. We also sow a certain amount of mixed grains, oats, peas and barley, or oats peas and wheat to thresh and furnish grain to crush for the cows.

Although we do not expect to follow this first year with a hay crop, we use a certain amount of clover seed when sowing the oats, or oats and peas, in order to have some clover to plow down in the fall. This keeps something growing on the land after the oats and peas are cut, which is generally early in August, and adds nitrogen and humus to the soil when plowed down in the fall, thus making an ideal preparation for roots the next year.

The objection to this rotation is found in the fact that it is likely to deplete the land, as it is not plowed up or manured often enough. The way to avoid this difficulty is to top dress quite liberally with barn yard manure after the second cutting of hay. Instead of cutting hay the sixth year of the rotation the land may be pastured; this would not take so much out of the land and would furnish a piece of excellant pasture every year for the use of some specially valuable live stock. Whether or not the land is pastured or cut over for hay will depend upon relative need of the farmer for those two crops.

A third rotation that may be used where relatively large amounts of hay and grain are needed and where farmers claim they cannot do the work of the shorter rotation, is as follows.

First year (following hay) . roots
2nd. " ....grain.
3rd. " ....hay.
4th. " ....hay.
5th. " ....grain.
6th. " ....hay.
7th. " ....hay or pasture.
8th. " ....roots again, and so on.

This rotation allows the two year old clover sod to be plowed in the summer to rot the sod, and again late in the fall to leave it rough for winter. The plowed ground can be manured in the fall, winter, or spring and prepared for roots in May. Following roots an excellent crop of clover should be obtained the first year and clover and timothy the second year. The second year's sod is plowed late in the fall, the after-feed may have been pastured, or it may be plowed down to rot and make plant food for the grain crop to be put in next spring. When the grain is sown the following spring some phosphoric acid fertilizer should be used, say 300 to 500 lbs. per acre of slag or acid phosphate, and a liberal seeding of clover and timothy put in at the same time. The next two years will give a good crop of clover again and after the second year's crop is cut in July the sod can be plowed and rotted again in preparation for another crop of roots. As only a few acres of roots are grown each year some manure will be available to use on the hay fields each fall or winter in order to keep up or increase the fertility of the farm. If the land is kept in clover 4 years out of 7 as provided for in the above rotation, nitrogen will be gathered from the air in large enough quantities to supplement that supplied in the barnyard manure so the soil will always contain a good supply of this necessary and expensive element if the clover hay is fed on the farm. The decaying vegetable matter turned down by frequent plowing will liberate potash which is present in large quantities in most of our soils. The addition of slag, acid phosphate, or bone meal, furnishes the necessary phosphoric acid, and the use of lime completes the steps needed to make and keep a fertile soil.

The common practice of cutting hay on the same land continuously for from five to ten years is a sure method of depleting its fertility, and reducing materially the amount of animal food raised on the farm. Successful agriculture depends upon raising large crops and maintaining soil fertility. Too much stress cannot be laid upon the need for shorter rotations, better cultivation of the soil, and the raising of more grain and roots in order to make it possible to feed more stock at a profit.

THE CEREALS.

By J. M. Trueman.

The cereals commonly grown in Nova Scotia are oats, wheat, barley, rye and buckwheat. All these grains excepting buckwheat will germinate at a low temperature and are therefore well suited to grow during our cool spring weather. They also have in common the habit of growth called "stooling." This consists of putting out extra stems from the first joint of the plant just below the surface of the ground. These stems develop and form seed, and frequently add materially to the yield. When the weather is cool and moist it favors stooling; also thin seeding and rich land tend to produce the same result. On poor land and with late seeding very little stooling will take place and therefore relatively heavy seeding will be necessary.

Oats.

Oats are the most important of these cereal grains to the Nova Scotia farmer. The average yield per acre is less than 40 bushels. The value of oats as a feed for all kinds of farm stock, as well as for the manufacturing of oatmeal make it important that the farmer should increase the yield per acre as much as possible.

A 9 acre field of Oats on College Farm, note height.

Varieties.—Oats may be divided into a number of types and varieties. In the United States both winter and spring varieties are grown, but in Canada all fall or winter varieties are killed by the frost and only spring oats are grown.

Of these we have two types, the open or spreading panicle, and the closed panicle, generally called side, or horse mane oats. As a general rule the open panicle, represented by the Banner, Ligowo, Gold Rain etc. are heavier yielders and more popular than the side oats. Early Blossom and Black Tartarian are good examples of the side oats. There is no essential difference in these oats excepting in the manner of growth on the rachis, or flower stalk. The spreading panicle being caused by the branches of the head hanging loose and open, while on the side oats, the branches are more upright, and pressed together giving the panicle a closed appearance. Both in the United States and Canada there are more popular varieties of open panicle than of side oats.

Early and late varieties.—Oats may furthermore be divided into early and late varieties. Early varieties may not be any more prolific than late varieties but they have an advantage in Nova Scotia on account of the shortness of our seasons. Oats that ripen a week or ten days ahead of other varieties are more likely to be harvested during fine weather and thus escape the common trouble of September storms that cause lodging and make it difficult to get them cut and cured in good condition. For this reason it is well to avoid late varieties, but our best results have been obtained from those varieties that are neither very late or very early.

Thickness of hull.—Oats vary greatly in proportion of hull to kernel. From 20 to 40% of the total weight of the oat may be hull. Other things being equal the oats that have the thinnest hull, that is, largest proportion of kernel, are the most valuable. The oats raised on the college farm vary from 26 to 35 percent of hull. This percentage depends upon variety and condition of growth. The heaviest oats per bushel are not necessarily those with the largest proportion of hull. In some cases the percent of kernel is highest in short plump oats, and in other cases it is highest in the long slender oat. In our experience the Banner, Ligowo, Gold Rain and Kemp oats have given from 26 to 29% of hull, while the Early Blossom, Dodds White and Storm King have gone as high or will average considerably over 30%.

Character of straw.—Some varieties have strong straw, others weak. Thickness of seeding has a marked influence on the size of the straw. With thick seeding we get a finer straw better for feeding, but more likely to lodge. With thin seeding we get a coarser straw and stronger; and thus better able to stand up under the fall storms. The Banner, Ligowo and Gold Rain are medium in size and stand up well, while the Storm King is large and brittle and liable to break off at the head. Apparently there is no close relation between character of straw and yield.

Color.—Oats may be either black or white or a yellowish shade. The white oats predominate in Nova Scotia but a great many black oats are grown on Prince Edward Island. The Old Island Black oat has a thin hull and has always been popular as a feeding oat. For this reason many people have supposed that all black oats are better for feeding than white. This is not true, however, as some black oats have a very heavy hull, of which the fifty pound black is a notable example. The black oats as a class have not been as successful in Nova Scotia as the white. Gold Rain is yellowish and is not so popular as a show oat for that reason.

The varieties that we are raising on the College Farm at present are Banner, Ligowo, Early Blossom, Gold Rain, Kemp, and Sandy. Of these the Banner gives the largest yields. In 1914 a 5 acre field gave a total of 430 bushels or 86 bushels per acre. Ligowo gave 60 bushels, Early Blossom 56 and Kemp 57. These yields are not from small plots but were obtained under regular field conditions. Threshing is not completed for this year, and yields cannot be given.

Rust and Smut.

The oat plant is not troubled with many enemies. Rust occasionally causes serious losses, and there is no remedy known for this disease. It is likely to develop during hot moist weather, and so far as we know nothing can be done to prevent it. Two forms of smut may appear on oats, namely loose, and covered smut. Both forms are successfully prevented by treatment with formalin, and the proper method of procedure is given below under directions for seeding.

Place in Rotation.

On the College farm oats generally follow roots. This is possible because we raise a large amount of roots and this gives us enough well prepared soil on which to grow the oats. On our light soil we find that it is not advisable to plow the turnip land when preparing for oats. As early as possible in the spring the soil is stirred with the stiff tooth culticultivator, drawn by three horses (see cut). This loosens the soil to a depth of 6 inches but does not turn up the subsoil. The fine soil that had been hoed and cultivated all summer the year before and is largely free from weeds is left on the top and makes an ideal seed bed for the oats. If a stiff toothed cultivator is not available a disk or cutaway harrow, or even a stiff spring-tooth harrow will do the work. If the land is weedy it must be plowed as shallow as possible, and the weed roots worked out with the harrow. On the heavy land ridging the soil in the fall will materially aid in securing a good seed bed early in the spring. This is done by using small double mould board plows attached to the stiff tooth cultivator, and leaves the land quite rough without turning it over. This work may be done with an ordinary double mould board plow, or even a single plow. This gives the frost a better chance to act on the soil, and allows it to dry out and warm up earlier in the spring. On heavy soils this method is especially valuable as the quick drying and warming enables the farmer to prepare a mellow seed bed much earlier in the spring than where the land is left flat.

The Stiff Tooth Cultivator used instead of plowing in the Spring when Oats follow a hoed crop, College Farm.

No fertilizers are necessary for oats on the land where roots were grown the year before. The only danger is that the growth may be so rank that the oats will lodge.

Thin seeding will remedy this trouble to some extent, but not altogether.

When oats follow grass the land should be plowed the previous fall in order to gain the advantage of the action of frost in pulverising the soil, and to get the work done during the slack time. In the spring as soon as the land is dry there is a great rush of work. If plowing must all be done then, the farmer is sure to be late getting in his crop. The work of plowing should be pushed along in the fall, and then the farmer is often ready to begin seeding in the spring before the land would be in fit condition to plow.

If the land is weedy it should be plowed the previous summer as early in August as possible. Plow shallow and turn the sod over flat and roll down tight and harrow. As fast as the weeds start the harrow should be used to kill them. In this way many weeds will be killed before the end of October and the sod will be pretty well rotted. After this the land should be plowed deeply and left rough through the winter, although if in good mellow condition this last plowing is not necessary.

Rolling Sod immediately after Plowing.

Early seeding is a great help in growing and harvesting a big crop of oats. Of course the oats should not be put in before the land is in a fit condition to work, but every effort should be made to get the seed in as early as possible. There is very little danger of frost killing the young plants More damage is likely to come from fall frosts if the oats are not sowed early enough to get them ripe by the 1st. of September. Early seeding gives the oat plants a chance to develop a big root system and to stool out well during the cool moist weather of May and early June, and when warmer days of July and August come they are in proper condition to make rapid growth. I wish to emphasize emphatically at this point the great need for early preparation and early seeding; nothing interferes more with good yields of oats than the failure to be ready for work in the spring, and consequent late seeding.

It is too late to begin to look for seed, after the land is ready for sowing in the spring. This should be selected during the winter and every precaution taken to get the best. The cost of the best seed on the market will only be from 10 to 25c per bushel more than the cost of ordinary feeding oats. This difference in cost will amount at the most to say 75c per acre. If the good seed adds one bushel per acre to the yield it will pay for the extra cost. The chances are it will add ten bushels or more per acre and the return thus received for the care taken to get good seed is well worth while.

Every farmer who is raising any quantity of oats should select his own seed. Carefully selected seed is invariably much better than can be bought on the open market. A part of the field where the oats have done well, and are free from weeds should be threshed by itself, and the oats put through the fanners to clean them thoroughly and take out all light grains. For full directions as to how to raise seed that can be registered see article in this series on "Seed Selection."

Hand selection of Oats for seed on the College Farm by cutting model heads.

Just before sowing, the seed may be treated to kill smut by soaking for 20 minutes in a solution of formaldehyde. Formalin is bought at the drug store and one pint added to 30 gallons of water. The bags of oats are soaked in this solution 20 minutes and then the oats are spread out to dry on canvas in the sun, or on a clean floor. They should be put back into the same bags when dry, and every precaution taken to avoid getting dust from infected oats or floors again mixed with the seed. About 1 peck more per acre should be used when the oats have been soaked and are sown by drill as they will not run through the drill so fast as those untreated.

On good land, especially following roots, 2 bushels or even less of seed per acre is plenty. On poorer sod land in many places it will be necessary to use 3 bushels in order to get a good stand.

Oats can be cut at an earlier stage of ripeness than any other grain. They thresh easily, and if left standing until dead ripe a great many will be lost through shelling They should be cut just before the heads and stalks all turn yellow; while a slight green tinge is still noticeable over the field.

Oats are good feeders, having a very vigorous root system, and on ordinarily good land a large crop can be grown without the use of any fertilizer. Where sown on old sod, pretty well "run out", however, 500 lbs. per acre of Basic Slag, acid phosphate, bone meal, or a high grade fertilizer should be used. Since the oat is a strong feeder it will rapidly deplete the soil if grown on the same field year after year. This practice cannot be too severely condemned as it has been followed in the past greatly to the detriment of the fertility of Nova Scotia farms.

A Prairie Scene on the College Farm, Truro, N. S.

The average yield for oats in this province is about 39 bushels per acre. On the College Farm yields of 100 bushels per acre have been obtained, and although we cannot hope to make that a common yield we can, by better cultivation and shorter rotations greatly increase the general crop. The average might well, approach 75 bushels per acre.

Wheat.—Not all Nova Scotia land is suited for growing wheat. On low, rather wet land, or on heavy undrained land that is wet wheat is likely to be too soft for milling purposes, if it grows at all, as it does not do well on wet soil. It should, therefore, be planted on fairly dry, or well drained soil, a loamy soil made up of a mixture of sand, silt, and clay in almost equal proportions makes ideal wheat land. It requires richer soil than oats, and does best when following a root crop. Generally the land has been well fertilized for roots, and if it has been kept free from weeds it is in just the right condition to be seeded early in the spring. Early seeding is very important if a good crop is to be secured. The turnip land should not be plowed, but simply stirred up with the stiff tooth cultivator as described for oats. This method is exceptionally valuable for wheat as it grows best on a very compact soil, and if the land is plowed in the spring, or or even late in the fall, it will be too loose, unless worked over many times and tramped hard with the horses feet. Plowing also turns up many weed seeds and gives them a chance to grow up with the wheat. If the land is heavy and hard to work up in the spring with the harrows, it may be ridged up in the fall the same as for oats.

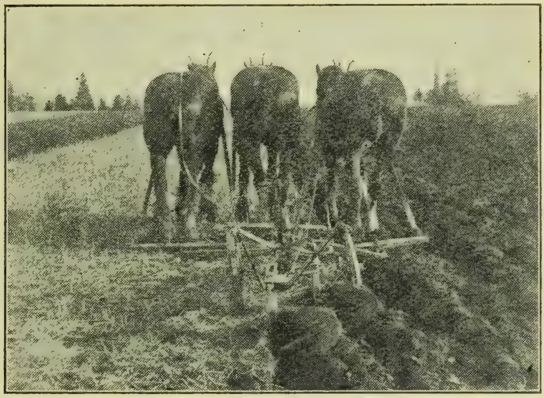
If planted on sod land it should be plowed in the fall, and thoroughly harrowed and compacted in the spring. It will also need some fertilizing as a general rule. Barnyard manure may be applied in limited quantities to the plowed land during the winter or spring and should be supplemented with from 400 to 800 lbs. of Basic Slag, Acid Phosphate or Bone Meal. If no manure is used, a dressing of 600 to 800 lbs. of a good mixed fertilizer may be applied. A home made mixture might consist of 150 lbs. of Sodium Nitrate, 400 lbs. Acid Phosphate and 100 lbs. of Potash. This mixture should be worked into the land with the harrow before seeding.

One of the advantages possessed by wheat over oats, is that it makes a better nurse crop for the clover and timothy. It grows more open and is less likely to lodge, and that gives the clover a better chance to develop.

On those farms where oats grow heavy and it is found difficult to get a good stand of new seeding with timothy and clover it is an excellant plan to seed with wheat instead of oats. Although the wheat may not give as good returns as the oats, the advantage gained in a good stand of clover, and consequent increase in hay crop for several years, more than offsets the loss.

The Varieties most popular in Nova Scotia are White Russian, Red Fife, Marquis and White Fife. The White

Russian gives a better yield than any of the others under average conditions. It is a softer wheat than the Red Fife but all wheat is fairly soft in Nova Scotia. Red Fife is probably harder than any of the others and is a good wheat to raise. Marquis is an early maturing variety and for that reason is especially popular in the west. In Nova Scotia it has given good yields during the past few years. The White Fife is not grown to any great extent.



A two-furrow plow. A great time saver on Stubble Land.

Rust and Smut on Wheat.

Loose smut and stinking smut both are found on wheat. The loose smut does not generally occur in sufficient quantities to do serious harm. The stinking smut is more serious and infected wheat should be treated with formalin, as described for oats.

There are two stages of rust found on the wheat plant. The loss from rust is occasionally very large, but no remedy is known. The ravages of rust are encouraged by hot moist weather. A great deal of study has been given to the discovery or production of rust proof varieties with as yet little success.

Barley.

There are two well marked types of barley, six-rowed, and two-rowed. In six-rowed type there are three spikelets each bearing a single grain arranged alternately at each joint of the rachis, thus making a spike with six rows of grain. When the lateral or outside grains of the alternate sets overlap in such a manner as to form one instead of two rows on each side, the type is known as four-rowed barley. In the six-rowed type it not infrequently happens that it is only four-rowed towards the tip of the spike. In the two-rowed type the lateral grains have failed to develop.

There are both winter and spring varieties of Barley. The winter varieties are not grown in Nova Scotia. The two-rowed type is a spring barley and is the most popular.

The hull of the barley remains on the kernel when threshed the same as in oats. Hull-less barley is sometimes put on the market and great claims made as to its value. It is only a cultural variety of the ordinary barley and has never been able to compete successfully with the hulled varieties.

The hull of barley may vary from 10% to 25% of the weight of the grain. The average is about 15%. The legal weight of barley in Canada is 48 lbs. per bushel.

Varieties:—Several varieties of both the two-rowed and six-rowed types are grown in Nova Scotia. The six-rowed types have given the largest yields on the College Farm, and also in Ontario where large quantities of barley are grown. On the contrary many farmers in Nova Scotia have reported larger yields from the two-rowed type.

The two-rowed barleys are later ripening, have stronger straw, and have thinner hulls. All these points tend to make the two-rowed more popular with the Nova Scotia farmer. Good results are reported from Prince Edward Island with Old Island two-rowed. This variety drops most of its awns in the field and is much better to handle on that account.

The varieties grown and the yields obtained for 3 years on the College Farm are given in the following table:—

Variety	*Bushels per acre for 3 Years.*		
Six-rowed.	1909	1910	1911
Oderbrucker	57	60	29
Mensury	54	54	32
O. A. C. No. 21	52	63	40
Mandscheuri	49	62.9	41
Odessa	46	46	30
Two-rowed.			
Duckbill	42	34	22
Canadian Two Rowed	31	29	21
Chevalier	28	35	33
Black Hulless	39	37	35
Guy Mayle	30	42	30

Of the above varieties the best known in the six-rowed are Mandscheuri, O. A. C. 21, and Mensury.

Mandscheuri was introduced and developed by the Ontario Agricultural College. They also developed O. A. C. 21 which is a pure strain selected from Mendscheuri.

Mensury is a valuable variety developed at the Central Experimental farm in Ottawa.

The best known and most popular two-rowed varieties are Duckbill and Chevalier.

Barley is not extensively grown in Nova Scotia. It cannot compete with oats as it requires a richer soil, and does not yield as much grain. It grows best on a well drained medium light soil. It requires a better seed bed and higher fertility than the other grains in order to produce a good crop. It does best following a hoed crop like turnips or potatoes. The soil should be prepared in the spring in the same way as for wheat but the barley can be sowed somewhat later than wheat without harm. Use from 1½ to 2 bushels per acre. Although not as likely to be attacked with smut as the oats, nevertheless it is well to treat with formalin as directed for oats and wheat. It may be sown after it is too late to sow oats or wheat, and may be of value to the farmer on this account when a late spring has delayed seeding. It makes a very good nurse crop for grass and clover, and will generally yield better than oats if seeding is delayed until late in June.

Rye.

The main value of rye in Nova Scotia is for a cover crop in the winter. For that reason winter rye is used, and there is very little demand for spring rye, except in a few sections of the province where the soil is very light. Winter rye is extremely hardy and is seldom killed out on dry land even by the most severe weather. It is a strong growing grain and will produce a good crop on land too poor to raise oats, wheat or barley. For this reason it is useful for sowing on poor land where it may be plowed down in order to add humus to the soil. Winter rye may be sown at any time from the 1st of September to the middle of October. It has been our custom to mix winter vetch with the rye. This makes a thicker growth to plow down the next spring and gathers a certain amount of nitrogen from the air. If the rye and vetch are needed for early pasture the cattle can be turned on about the middle of May. This makes a fair pasture for two weeks and where hay is scarce it will help out the late spring feed problem very well.

When plowed down it can be completely covered by using a chain on the plow beam. The chain is about five feet long and a weight attached to one end is dragged along in the furrow, so that it just clears the furrow slice as it rolls over. This draws the long rye down into the furrow, where it is well covered.

Plowing under Rye, the last of June, College Farm.
Note the growth for season of year.

When cut for seed it ripens early and gives a large yield of straw. The straw makes excellent bedding for horses, and in some parts of the country the straw is worth more than the grain.

The grain can be crushed and fed to cows to good advantage. One bag of rye, mixed with 1 bag of bran, 1 bag of middlings, I bag of Oil Meal or Cotton Seed Meal would make a good mixture.

Occasionally rye is attacked by a fungous called ergot. This causes the head to develop into a long black body generally curved so that it is often called horned, or spurred rye. Ergot if fed to animals in any quantities is popularly believed to produce serious results. It is difficult to separate from the healthy grain, and seed known to be infected should not be used. It does not generally occur in serious quantities, however, and the latest investigations indicate that it is very unlikely to produce any harmful results even when eaten freely.

BUCKWHEAT.

By J. M. Trueman.

Two species of Buckwheat are grown in Nova Scotia. They belong to the genus Fagopyrum. The rough or gravel Buckwheat is *Fagopyrum Tataricum*, and the Japanese, and Silver Hull are both varieties of *Fagopyrum esculentum.*

Buckwheat belongs to the family of plants known as Poygonaceae, which includes a number of well known and troublesome weeds, such as sorrel, dock, smartweed, knotweed, and bindweed.

The Buckwheats are not natives of this country but originally came from Eastern Europe or Western Asia. They have become naturalized in America however and are found widely distributed. Britton & Brown in their work on the "Flora of the Northern States and Canada" describe the two species named above, and state that *F. Tataricum* grows in waste places in Canada and Eastern Maine and is called Rough Buckwheat. In the Cyclopedia of American Agriculture, J. L. Stone in an article on Buckwheat states that "Tartary buckwheat, or Indian wheat (*Fagopyrum Tataricum*) is cultivated in the cooler and more mountainous regions of Asia and to some extent in Canada and Maine. It is recommended for superior hardiness. The grain is smaller than the common buckwheat (of the United States) the plants are more slender and the leaves arrow-shaped. The flowers are small and greenish. It is earlier than common buckwheat."

In his work on the "Origin of Cultivated Plants, De Candolle has the following—

"Tartary Buckwheat *Polygonum tataricum. Linnaeus*; *Fagopyrum tataricum,* Gaertner.

"Less sensitive to cold than the common buckwheat, but yielding a poorer kind of seed, this species is sometimes cultivated in Europe and Asia, in the Himalayas for instance; but its culture is recent. Authors of the 16th and 17th centuries do not mention it, and Linnaeus was one of the first to speak of it as of Tartar origin. It is undoubtedly wild in Tartary and Siberia as far as Dauria.".

In a letter from Wm. H. Moore of Scotch Lake, N. B. I find the following statement—"There are several local names for the grain known in this section as rough buckwheat

They are Yellow, Rough, Gravel and Rye, but the correct name is "Tartarian buckwheat."

From a careful study of these authorities I am convinced that the common buckwheat of the Maritime Provinces is *Fagopyrum Tataricum*, and that its correct common name is Tartarian buckwheat.

A variety known as Rye Buckwheat is grown to a small extent in the Maritime Provinces. It is a variety of *F. Tataricum* or the rough buckwheat It is not much grown at the present time.

Under ordinary conditions from year to year, the Tartarian buckwheat gives the best returns. When the season is just right, not too hot and not too wet, and the soil not too poor the Silver Hull will give as good or better results than the Tartarian

Under all conditions, however, Tartarian, (the rough or gravel variety) is most satisfactory for Nova Scotia. As an average of ten years' experiments, the Tartarian, at the Ontario Agricultural College, gave ten bushels larger yield per acre, and weighed more per bushel than any other variety. The average yield per acre was 32.88 bushels and the average weight 51.37 lbs. per bushel.

This grain is suited to a cool moist climate, and does best on a rather sandy well drained soil. It will give a better crop on poor land than any of the cereals. For this reason it is often used as green manuring crop to improve poor land. It is rather rich in ash and nitrogen and the stalk rots easily, these qualities making it especially well fitted to plow down. The Silver Hull varieties grow a ranker heavier crop of straw than the rough and are therefore more valuable for this purpose.

Buckwheat requires a shorter season than any of the cereals, and for this reason is especially valuable when for any reason it has been impossible to get oats or wheat sown in good time in the spring. If it gets too late in the spring before seeding oats to hope to get a good crop, buckwheat may be substituted with every prospect of good results, It may be sown any time up to the 20th. of June but must be ripe early in September as it is easily killed by frost.

For plowing down it may be sowed later and turned under as soon as a good growth is attained. Although it will grow on rather poor land it readily responds to good treatment. If a large crop of grain is the aim of the grower a light application of some form of phosphoric acid is all that is likely to be required. If the land is too rich, especially in nitrogen the grain may lodge badly and unlike the cereals it has no means of rising again.

The land should be prepared in the same way as for oats and about 1 bushel of seed used per acre. As the buckwheat grows rapidly and forms a dense leafy covering on the soil it is an excellent crop to crowd out weeds, and leaves the soil in a fine mellow condition for following crops.

HAY.

By J. M. Trueman.

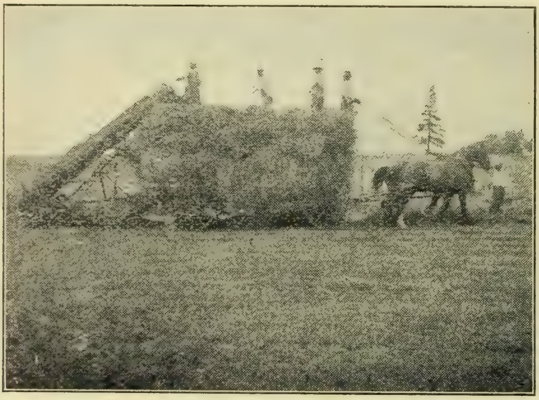
More acres are devoted to raising hay in Nova Scotia than to any other one crop, and its commercial value is much greater than any other crop. The great bulk of this hay consists of timothy and clover. The seed is sown in the spring with either wheat, barley or oats. As oats are the main grain crop in Nova Scotia the greater part of the seed for hay is sown with the oats.

When the soil is properly prepared for oats it will generally be in good condition for the reception of the grass seed. The oats, when put in with a drill, are buried quite deeply in the loose soil by the hoes, or discs of the machine, and the grass seed is scattered over the surface of the ground just in front of the discs, and is thus covered lightly. When sown by hand the oats are covered by a disc, or spring tooth harrow, and the grass seed is scattered on the top and lightly covered with a spike-tooth smoothing harrow.

The amount of seed used per acre is generally too small being only about eight lbs. of timothy, 5 lbs. of red clover and 2 lbs. of alsike. It is a good plan to be liberal in the use of seed, especially of clover It is our custom at the present time to sow from 8 to 10 lbs. of timothy, and from 8 to 10 lbs. of red clover on our dryer upland fields. The alsike does not do so well on our dry sandy soil as does the red clover, the alsike being better suited to heavier moister soils. On the marsh lands, we would use 8 lbs. of timothy, 3 lbs. red clover and 5 lbs. alsike.

In mixtures of grasses for hay it may be wise to add red top under some circumstances. For moist heavy soils or low intervals a good mixture is timothy 8 lbs., red top 5 lbs., red clover 4 lbs. and alsike 3 lbs.

The first year that new seeding is cut the crop is almost universally good, and a fair crop is generally secured for two or three years. The great failure in the hay crop comes on land that has been in grass too long; four, five or even ten years sometimes pass by before the hay field is plowed up and the rotation started again. The evils of this method of farming are pointed out in the article on "Rotation of Crops." If the fields are left in hay only two years and then plowed up the crops of roots, grain, and grass will all be materially increased. Where the land devoted to grass is so extensive, however, that it cannot all be worked over every five years and hay is cut continuously for long periods it is almost impossible to keep up the fertility of the land. It is a common belief among farmers that grass is not so hard on the land as oats, but a two ton crop of hay takes more out of the land than a 40 bushel yield of oats. In spite of this many farmers expect to keep up the fertility of their soils when raising hay continuously who would not think of trying to do the same thing with oats. A crop of 40 bushels of oats per acre including the straw (1½ tons) is compared in the following table with a yield of 2 tons of hay from mixed grasses.



The Hay Loader in action, College Farm, Truro, N. S-

Pounds of fertilizing constituent taken from soil per acre.

		Nitrogen	Phosphoric Acid	Potash
Oats	Straw, 1½ tons per acre			
	Grain, 40 bus. per acre	43.32	17.31	52.60
Hay, 2 tons per acre		47.60	10.80	62.00

It is clearly shown by these figures that hay is harder on the land than oats, and this explains why so much of our hay land is giving light crops when left without plowing for a number of years. It would take over $10,00 worth of commercial fertilizer each year to replace the amount of plant food taken from the soil by a good crop of grass, and where hay is only worth $10.00 per ton at retail or about $6.00 standing it would not pay to use this large amount of fertilizer. On the other hand where hay is worth $20.00 at retail a farmer might well afford to keep up the yield as long as possible by this method. In that case the best result would likely be attained by the use of small amounts of sodium nitrate, say 150 lbs. per acre and a more liberal allowance of phosphoric acid, slag, acid phosphate or fine ground bone meal, say 400 lbs. This would not replace the potash but as that compound is found in large quantities

$3\frac{8}{10}$ tons of Clover and Timothy mixed on the College Farm, Truro, N. S.

in practically all our soils its addition is not likely to increase the yield to any great extent.

Where the farmer wishes to cut a good crop of hay for three or four years and then plow up again, the application of 300 to 500 lbs. of slag or other fertilizer after the second cutting of hay will be found most satisfactory.

Questions.—
What reduces most seriously the yield of hay in Nova Scotia? Ans. Leaving the hayfield too long without plowing.

Ques. How does this interfere with a heavy yield? Ans. The land becomes hard, is depleted of its humus, and drained of its plant food.

Ques. Which crop removes the most fertility from the land, hay or oats? Ans. Contrary to the general belief a 2 ton crop of mixed hay is harder on the land than a 40 bus. crop of oats. For explanation see article on hay.

Ques. Is it possible to maintain a good yield of hay continuously without depleting the soil? Ans. Practically this is impossible. The plant food may be supplied by the liberal use of manure and fertilizers as a top dressing, but the cost of this material is too great to make it a good business proposition, unless hay is sold for a very high price.

Ques. How many acres of hay are cut each year in Nova Scotia and what is the average yield. Ans. Approximately 505,000 acres and the average yield is about 1.5 tons per acre.

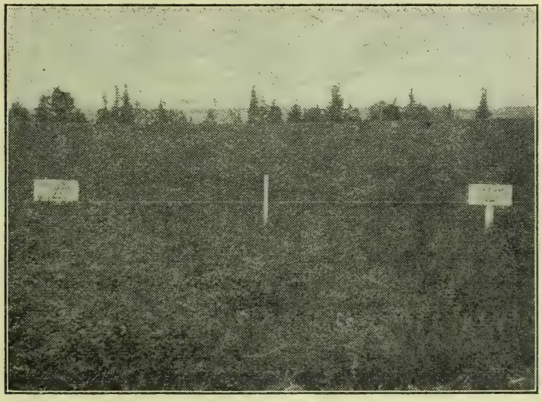
Ques. How much could this be increased by a shorter rotation? Ans. The yield might be increased to 2 tons per acre or a total addition of 252,000 tons which at $10.00 per ton would mean an increase in revenue from hay to the farmers of this province of $2,525,000.

Clover.

By J. M. Trueman.

The clovers belong to the family of plants known as leguminosae. They are of particular interest to farmers for two reasons. First because they are richer in protein than any other class of fodders we can raise, and second because they have the power of obtaining nitrogen from the air and so of enriching the soil in which they are grown.

As to the first of these qualities we find that the great bulk of our fodders, such as timothy hay, turnips and corn, are all low in protein, and in order to furnish the proper rations for young stock and milking cows we must buy a great deal of expensive protein. A part of this expense can be saved by raising larger quantities of clover hay, as it furnishes protein in excellent form for feeding the two classes of stock mentioned above.



A Clover Field; Lime Stone used on left, none on right.
Stakes the same height, College Farm, Truro.

The second good quality possessed by the clovers the ability to gather nitrogen from the air, is one of great value to the farmer. Nitrogen is our most expensive fertilizing element. Four fifths of the atmosphere is composed of nitrogen but only this family of leguminous plants is able to use it as food. They are enabled to do this because of the growth upon their roots of certain forms of bacteria. These bacteria during their growth are able in some way to build up the free nitrogen of the air circulating in the soil into nitrogen compounds suitable for plant food. Furthermore the plant is able to secure or to make use of this combined nitrogen at once, and we have here an example of a parasite that is of wonderful benefit to its host. Not only is the nitrogen used by the clover plant to produce a larger crop, but the amount stored in roots and stubble add materially to the nitrogen content of the soil when plowed under and converted into humus.

Varieties.—The clovers we can grow in Nova Scotia are Medium Red, Mammoth Red, Alsike, White or Dutch, Crimson, Sweet Clover; and Alfalfa; the last two named, however, are not true clovers.

Medium Red Clover.

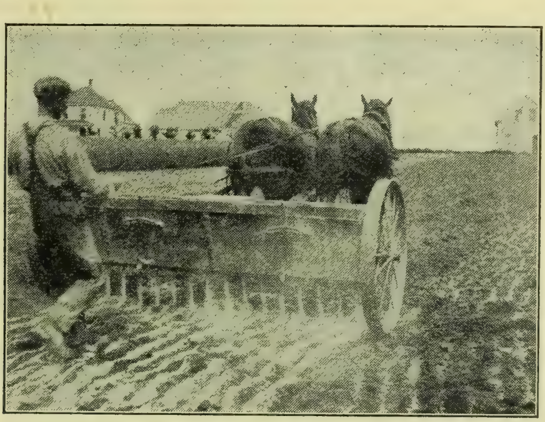
As far as we are concerned Medium Red Clover, or what is commonly referred to by farmers simply as red clover, is bv far the most important of the group. Its good points are as follows:—It is easy to get a "good catch" in seeding; it will yield more hay than any other clover; it will withstand frost as well as any except Alsike and it will add more nitrogen to the soil by the nitrogen gathering bacteria that grow on its roots than any other. It is a biennial, and therefore must be reseeded after two years in order to keep it growing. The plants grow the first year of seeding without producing blossoms, but start early the next spring, grow rapidly and blossom. If cut early so that the seed is not allowed to ripen it will produce another crop of blossoms and form seed from the second cutting of the second season after seeding. It is from this cutting that most of our commercial seed is obtained. If the second growth is not allowed to ripen but cut early in the fall a good many plants will grow again the third year, and make a fair mixture of clover in among the timothy that is generally growing on the same field. The disappearance of clover from the third year's cutting, however, is not a sign that clover will not grow well on any given farm, but simply means that the plant has completed its life cycle and should be sown again in order to get a new stand. For the importance of this point readers are referred to the article on "Rotation of Crops."

Many times we are asked if Alfalfa is more valuable than Red Clover. In the present state of Alfalfa growing I have no hesitation in saying that Alfalfa is not to be compared with Red Clover in real value to the Nova Scotia farmer. Alfalfa is practically an impossible crop for general conditions. It costs too much to get it started, it is too much subject to winter killing, and does not yield even in two cuttings as much hay as one good cutting of Red Clover. At the College Farm this year we cut a very nice crop of

Alfalfa. The seeding was perfect, the season suitable for good growth, but the Red Clover under the same conditions gave more at one cutting than did the Alfalfa at two and the second cutting of clover was heavier than the second cutting of Alfalfa.

Red Clover, however, has for many years demonstrated its value and justified its place as one of the most useful of our fodder crops.

It grows best on good land that is free from acidity. Probably no crop is more injured by sour land than clover This is undoubtedly due to the fact that the bacteria which live on the roots of the leguminous plants and gather nitrogen from the air, do not thrive in acid soils.



Distributing ground Lime Stone on College Farm,
4 tons per acre.

A great majority of the Nova Scotia soils tested by this department are found to be acid, and this is doubtless the reason why clover does not do as well as it should in many places. The remedy for this condition will be found clearly given in the article on "Lime In Its Relation to Agriculture."

When land is properly prepared for oats or wheat in the spring it is in the right condition for clover. Where oats or wheat follow roots the conditions are ideal for clover seeding and the proper method of procedure is given in the article on "Hay."

It may be worth while to repeat here the caution against being too sparing with clover seed. Although it is expensive, it pays to buy only No. 1 quality from a reliable firm and to buy enough to make it possible to use from 8 to 10 lbs. of seed per acre, when sown without other clover, or from 6 to 8 lbs. when sown with alsike.

If clover does not grow readily on the farm being seeded the seed used should be treated with a pure culture of bacteria that live on clover roots. This culture can be obtained from the Nova Scotia Agricultural College, with full directions for its use.

Mammoth Red Clover.

As its name indicates Mammoth Clover is a large variety of red clover. The stems are long and coarse and do not make as palatable hay as the medium red. It blooms later than the medium and is better to cut with timothy on that account. It starts slowly after cutting and does not grow much second crop, and can therefore only be cut once each season.

Alsike.

Alsike clover is a perennial and under good conditions will persist in the mowing field for a number of years, and has this one advantage over Red. Clover. Its stalks are finer, the leaflets shorter, and comparatively broader, and the flower heads have much longer stalks than Red Clover. In color the flowers are between those of Red and White clover. They usually vary in the same head from white to rose, because they are white when young and gradually change to rose, beginning at the base.

Alsike does best in a moist climate or locality, and will thrive on land too wet for Red Clover. It should be used in connection with Red Clover, Timothy and Red Top. If sown alone it will not produce a heavy crop of hay and its weak stems cause it to lodge. Sown with other grasses, however, at the rate of two or three pounds per acre it is held up by the Timothy and Red Top, and forms a valuable addition to the grass field. On rather wet heavy land it may be used in large quantities, and less Red Clover sown. On the marsh we often sow as much as five pounds of Alsike and as little as three pounds of Red Clover.

White or Dutch Clover.

White clover is a perennial and in its natural state grows in patches. It spreads by means of trailing stems that creep along the ground and root at the joints. The heads develop from the lower part of the stem, and are pure white.

White clover occurs naturally in meadows and pastures, along roadsides and in valleys and mountains. It grows on a great variety of soils, but does best on well drained loams supplied with lime and humus. When once established it covers the ground rapidly both by means of the creeping stems and by self seeding. The seed drops from the heads that are brown when ripe, and falling on the ground retain their vitality for a long time. This double method of propagation accounts for the rapidity with which White Clover will cover the ground under favorable conditions, and the power of the seed to retain its vitality for a long time and then grow when conditions come right explains why it will often suddenly appear in places where none has been sown for some years.

White clover is only valuable in pastures and on lawns. In the pasture it makes a thick growth of succulent palatable feed much relished by all classes of stock. When conditions of soil are made favorable it rapidly spreads over our pastures in Nova Scotia.

SWEET CLOVER.

Sweet clover has never been cultivated to any extent in Nova Scotia. Some reports from the United States, as well as from this country indicate that it may be valuable as a pasture grass but it is still in the experimental stage. A plot grown last year on the college farm did not produce as well as alfalfa or red clover. When young it is tender and will be eaten by cattle, especially after the taste for it has been acquired. It gives a peculiar flavor to milk and butter that is not relished by most people. It does not give a high yield of hay, and when allowed to ripen or flower, its stems become very woody. Its chief value is to supply nitrogen from the air the same as the true clovers, for although not a clover it belongs to the leguminous family. The tubercles on its roots appear to be identical with those growing on alfalfa, and the same pure culture can be used for both plants.

Sweet clover will grow wherever other clovers thrive, and is even hardier and better able to survive on poor land than red clover. Its feeding value, however, is limited and as near as we can tell at present it is not of any real importance to Nova Scotia farmers.

Crimson Clover.

Crimson clover is an annual, and is easily identified by its long spikelike head of rich scarlet or crimson flowers. It has a strong root system, and does best on rather light sandy soil, and very poorly on wet heavy soils. It is best suited to a warm climate and is killed by our winters. As it is an annual, however, it can be sown in the spring and will produce a crop the first season. It makes good hay when cut early before the flowering stage. The blossoms when ripe are provided with many long stiff hairs, that are likely to cause serious digestive troubles.

The main value of crimson clover in Nova Scotia is as a cover crop in orchards. Under favorable conditions it produces a fairly large amount of green material to plow under, thus furnishing the orchard with a valuable amount of nitrogen.

ALFALFA.

Alfalfa is one of the most important nitrogen gathering plants. It closely resembles clover in its habits and requirements, but is much more likely to be killed out during the winter. It contains a larger percentage of Protein than clover, and is rather more valuable for feed on that account. If we can secure a variety that will stand Nova Scotia winters it will be a valuable acquisition to our forage crops. Occasionally a favorable winter allows it to come through without injury and in such cases it yields well, giving two on even three good cuttings in one season.

Alfalfa 17 days after first cutting on College Farm, 1915.

There are four species or types of Alfalfa grown in America.

*Common or Violet Alfalfa (*Medicago sativa*) is a species suited to a moderately warm climate. It is extensively grown in the southern and south western parts of the United States and in the central states of America. This variety has an upright habit of growth and numerous stems grow from the crowns of the roots.

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*Description taken from article by Prof. C. A. Zavitz read before the Canadian Seed Crowers Association in 1914.

Variegated Alfalfa (*Medicago media*) is a crossed variety, supposedly between *Medicago sativa* and *Medicago falcata*. The plants are mostly upright in habit of growth. The flowers are variegated in color, and besides the violet, include shades of blue, green and yellow. The seed of this type closely resembles that of the common Alfalfa.

Yellow lucerne (*Medicago falcata*) grows wild in some European and Asiastic countries and is considered to be very hardy. It has a spreading habit of growth with narrow leaves and yellow flowers.

Hairy stemed yellow Lucerne (*Medicago ruthenica*) has a spreading habit of growth and yellow flowers.

Professor Zavitz reports that the average yield of hay per acre from these different types for four years was as follows— "variegated alfalfa 3.4 tons, yellow lucerne 2.2 tons, common or violet alfalfa 1.1. tons, and hairy stemmed yellow lucerne ¼ ton." "Of the common or violet alfalfa The Turkestan seed obtained from Asia has given fairly satisfactory results. In no case has the seed of the common variety from the United States given good results."

The variegated alfalfas are the only ones that promise success in Canada at the present time. As shown above, this type is a cross between the common blue flowered alfalfa and the hardy yellow lucerne. To this type belong the Ontario variegated, Grimm, sand lucerne and baltic. The Grimm and baltic are the same variety, and the term baltic has nothing to do with the Baltic Sea. These two varieties and Ontario variegated furnish the best seed that we can use in the Maritime Provinces at the present time. Although these varieties are a cross between the common blue flowered type and the yellow lucerne the flowers resemble quite closely those of the common or violet alfalfa. A few yellow blossoms sometimes appear, and many that are of a light blue, almost white. It is difficult, however, to determine by the color of the flowers and the appearance of the leaf whether a field of alfalfa is composed of Grimm's, Ontario variegated or the common violet alfalfa. For this reason it is important that farmers purchase their seed from strictly reliable firms in order that they may run no risk of receiving either Turkestan or common alfalfa, which are not hardy in this climate.

The most successful plot ever grown on the College Farm at Truro was seeded in July 1914. The land was in corn the year before, and was plowed late in the fall. It was summer fallowed during the month of June and part of July and frequently harrowed in order to kill weeds and secure a good tilth.

This summer cultivation is extremely important. Alfalfa is easily choked out with weeds, and in a country where rain is abundant weeds grow rapidly. For this reason weed seeds must all be germinated and the weeds killed before putting in the alfalfa seed. The best way to do this is to cultivate frequently during the early summer.

First cutting of Alfalfa on College Farm, 2 tons hay per acre.

This is not always a successful method, and in order to show that anyone may find serious trouble in getting the land in good condition the following account of our past summer's experience is given.

It was very wet during May and June, and we were unable to get the weeds killed on the plot where we sowed alfalfa. The result was practically a complete failure as the weeds grew faster than the alfalfa and choked it out.

In preparing the 1914 plot we were more successful in killing the weeds during the early summer, and the alfalfa got a good start and grew well. This cultivation not only kills weeds, but also makes a fine seed bed; it puts the soil in excellent tilth for the reception of the small alfalfa seeds.

A dressing of four tons of ground limestone per acre was put on the land the fall of 1913, and as it still gave an acid reaction the next spring four tons more were applied. In addition to this the acre plot received 500 lbs. of Sydney basic slag, 200 lbs. of acid phosphate and 300 lbs. of bone meal.

Twenty lbs. of seed was sown per acre, the variety known as "Ontario variegated" being used. The seed was treated with a pure culture of the proper variety of bacteria, which may be secured from the Bacteriological Department of the College at Truro. It is no use to sow the seed without this treatment on land that is not inoculated with the proper bacteria. This inoculation may be obtained by sprinkling a small amount of soil over the new plot, from a field where alfalfa has been successfully grown. This method is slow and cumbersome, however, and equally good results can be obtained by the use of the pure culture.

About the middle of July 20, lbs. of seed was sown per acre through the regular grass seed attachment on the grain drill. The seed germinated quickly and made a vigorous growth so that by the middle of Sept. it was 18 inches high, and would have made a very fair amount of hay if it had been cut. It was allowed to stand, however, and wintered without any other cover than that supplied by the Alfalfa itself.

Alfalfa in rows on College Farm, May 31st, 1915.

In addition to the land seeded broadcast a few rows were drilled in 2 feet apart with a Planet Jr. garden drill. The rows were kept cultivated and weeded and made a much stronger growth than that sown broadcast.

The greatest difference was found in the root development of the plants in the two plots. The roots of the plants crowded close together in the broadcast seeding were slender and branched but little, while those from the plants in the rows were much stouter and had many strong lateral branches.

Time of Cutting.

Formerly we were told to cut alfalfa when about one quarter of the blossoms were open. We have learned, however, that the condition of the new shoots at the crown of the plant is a better guide than the numbers of blossoms that have opened. The cutting should not be made until the new shoots are about 2 inches long. They should be long enough to furnish some protection for the crown and to allow the plants to keep on growing quickly when the old stems are cut. They should not be long enough to be cut by the mowing machine, about 2 inches being the right length. If the plants are examined late in June these new shoots will be found starting from the crown, among the old stems, and the same thing will be true for the second cutting about six weeks later. Two good cuttings in ordinary seasons is all we can expect in this climate. Late cutting in September or in October is almost sure to leave the plant with too little natural covering to stand the winter.

Alfalfa in rows on College Farm, June 18th, 1915.

A top dressing of stable manure after the second cutting will help to keep up a good growth and prepare the plant for the next year. This treatment is especially valuable if three cuttings are made, as it will furnish some protective covering as well as plant food.

We do not think that alfalfa can take the place of red clover on our Nova Scotia farms. It is still in the experimental stage, and it is too expensive to prepare the ground and start the seed to make it a popular crop. In future years we may find a variety that will be useful to us, but we advise the farmer to go slow in trying alfalfa seed at present.

As far as can be ascertained the essentials for successful alfalfa growing are as follows :—

1st. Carefully selected northern grown seed, Ontario variegated, Grimm, or baltic.

2nd. A soil that is never water-logged and in which the sub-soil drainage is good.

3rd. The liberal use of lime, preferably ground limestone, in order to get rid of all acid in the soil, and thus make it suitable for the growth of the nitrogen gathering bacteria.

4th. A fairly liberal use of Phosphoric Acid in fertilizing the land.

5th. Land as free from weeds as possible.

6th. The avoidance of late cutting so that the plant always goes into winter with the ground well covered.

7th. Inocculation of seed.

GREEN FORAGE CROPS.

By J. M. Trueman.

On most farms where a fairly large herd of dairy cows are kept it will be found useful to grow some green feed to supplement the pastures. A large number of cows can be kept in this way without overstocking the pastures. The crops that are best suited for this purpose are winter rye, clover, oats, peas and vetch sown together, corn, rape and soft turnips. These crops are named in the order in which they will be used during the summer.

Winter rye and winter vetch may be sown together in September or during the first two weeks of October, using one and a half bushels of rye and one half bushel of vetch. This crop will start early in the spring and can be used for early pasture, or cut green and fed to the cows the latter part of May or early in June. The land upon which it grows can be planted with oats and peas for green feed after the rye is cut. Rye is not of much value where pasture is available except for the purpose of keeping the cows off the pasture until after the first week in June, as at that time the grass is very watery and the land often soft, and much injury may be done the pastures by turning the cattle out too early. Where green forage or soiling crops are used entirely instead of pasture the winter rye and vetch will furnish feed from the middle of May to the middle of June when no other green feed is available.

Following rye, red clover will be ready to cut about the middle of June. This will come from the first mowing of a piece seeded the preceeding spring and may be used until oats, peas and vetch are ready. The clover, mixed with some timothy, may be taken from the regular hay field, using what is necessary until the spring sown crop is ready.

A Crop of Oats, Peas and Vetches averaging over 11 tons of green feed per acre.

As early as possible in the spring seed a good rich piece of land with oats, peas and vetch in the proportion of 2½ bushels of oats ½ bushel of Canada Field Peas and ⅓ bushel common vetch. This will be ready to cut about the first of July and will furnish from 8 to 12 tons of green feed per acre. A second sowing of this mixture should be made about three weeks later than the first, and if corn does not grow well in your section, make another sowing of the oats, peas and vetch as late as the 3rd. or even the 4th, week in June. This material should keep the cows in green feed until early in September, when corn will be ready for cutting or second growth clover.

Corn should be considered a little more carefully at this point than the other crops we have been describing. A number of years ago corn was very much praised as a silage crop for Nova Scotia, but of late years it has rather lost its hold upon the farmers' esteem. Especially is this true of the Northern and Eastern part of the province. The cold late springs, and the early frosts of Colchester, Cumberland, Pictou, and Guysboro counties and the whole of the Island of Cape Breton make it almost impossible to raise a satisfactory crop of corn. The southern part of the province, however, generally has a growing season long enough and warm enough to raise a very good crop of corn for the silo.

In order to get a heavy yield of corn, the land must be in good condition and quite fertile. Corn following clover is likely to give the best results. A clover or grass sod is manured in the early fall and allowed to start up well in the spring, and this green clover and grass plowed down the last of May makes an ideal soil condition for the corn plant. If the land is very weedy this method should not be used, but plow early the fall before and harrow frequently to kill as many weeds as possible. If the land is fairly free from weeds and plowing can be delayed till late spring, the decaying grass and clover will warm and lighten the soil, and furnish plant food during the middle of the summer, just when the corn roots are in the best condition to feed rapidly.

Harvesting Peas, Oats and Vetches with ordinary mowing machine and hay wagon

If the sod land is too poor, to make it grow a large amount of grass by the latter part of May, plow it in September and seed with winter rye and vetch. Manure this crop liberally through the fall and winter and it will make a rapid growth in the early May. Plow this down in the same way as advised for the clover sod and plant corn the last of May and it is likely to make a good growth. For the best results the corn should be planted rather thinly in the row and the rows should be 3½ feet apart. For a large yield of fodder corn this is to be preferred to the check row system. If an attempt is made to get a great many ripe ears then plant in hills 3½ feet apart each way. When planted in drills the regular grain seeder may be used by stopping up the proper number of outlets.

By the 1st. of September the corn will be large enough to cut green for the cows, and may be used for this purpose if the oats, peas and vetches are all gone. By the 1st. of October the corn is ready for the silo and should be cut and put directly through the cutter, or if quite green it may be cut and shocked for a few days and then cut into the silo.

Putting green Oats Peas and Vetches through the ensilage cutter and into the silo on the College Farm.

The varieties that have given the best results for silage on the College farm are White Cap Dent, Compton's Early, and Longfellow. Canada Yellow will furnish more ripe ears, but not enough fodder.

In the northern and eastern part of the province we are recommending the use of the oats, peas, and vetch mixture for filling the silo. The seed should be sown early in the spring. as the cold moist weather of early summer is likely to give a heavier crop than the dryer hotter weather of late summer. The seed is used in the same proportions as recommended above for green feed..

The soil must be fairly rich in order to get a good crop. It will not pay to bother with four or five tons of green feed per acre to put in the silo. Last year on good soil manured with about 15 loads of barnyard manure per acre we grew 45 tons of green feed on 3 acres. This year the soil was not so rich and the results were not so good. The peas and vetch require a rich soil in order to grow luxuriantly, and if this mixture of oats, peas and vetch is put on poor soil the grower will be disappointed with the results. The crop should be cut and put in the silo when the oats are in the dough stage, before they begin to turn yellow. If left until the straw is yellow it makes the crop too bulky for its weight and it will not settle solidly enough in the silo to keep well. The crop is mowed with an ordinary mowing machine, piched on the wagons at once and run through the ensilage cutter into the silo.

1 ton Soft Turnips with tops from 4 sq. rods, 40 tons per acre, College Farm.

Turnips.

For late fall feeding nothing is better than white turnips. They should be put on good land and treated the same as the ordinary turnip crop, as far as hoeing and thinning is concerned. They may be planted later than "swedes" with a good prospect of getting a heavy crop as they grow very fast and do not need a long season. They should be pulled during October and November and fed to the stock tops and all. Forty tons of green feed per acre can be grown in this way, and it is greatly relished by the cattle. These turnips make good fall feed for sheep, as well as cattle.

RAPE.

Rape fills about the same place as the white turnips, but is better suited for young stock that cannot eat the turnips without having them cut. Rape forms no fleshy roots and only the tops are eaten. These tops resemble

Rape for fall feeding of Cattle, College Farm, furnishes 20 tons or more fodder per acre.

swede turnip tops in their taste and composition. The seed is generally sown in rows the same distance apart as for turnips, but the plants are left standing closer in the row. It is cut in October and November, and is excellent for pigs, sheep and calves, as well as for cows and steers, The standard variety is "Dwarf Essex" but we have had good results with a variety called "The New Cabbage Leaf."

POTATO CULTURE.

By W. S. Blair, Supt. Experimental Farm, Kentville, N. S.

Soil.

The potato requires a friable loam soil naturally well drained and fairly rich. Such soils do not suffer from excessive moisture nor are they so liable to dry out during a season of little rainfall. Experience has shown that potatoes can be grown successfully on a great variety of soils provided attention is given to the development of suitable soil conditions. Clover sod is preferable for making soil conditions just right for the potato. The best growers plant potatoes on clover sod only. The clover plant has a tendency to make a friable soil out of a heavy one and bind together a light soil. The decaying roots open up the heavy soils making them less compact and render the light soils less leachy and more retentive of moisture. No farm crop is more exacting than the potato in soil requirements and no amount of work on our part will meet many of the requirements of this crop like the clover sod. The deep fibrous roots of the clover gives a yielding character to the soil so necessary for the production of good smooth marketable tubers.

Soil Fertility.

The potato requires a fairly rich soil for profitable crops. A soil on which a good crop of clover has been grown and the sod turned under will produce a good crop with an application of 200 lbs. nitrate of soda and 500 lbs. acid phosphate per acre. A grass sod may be used but it has not the depth nor quality of sod that is required. If stubble land is to be used manure at the rate of 10 to 15 tons per acre supplemented with 100 lbs. nitrate of soda and 400 lbs. acid phosphate should give good results. The amount of commercial fertilizer that may be profitably used can be determined only by the grower himself who should know the possibilities of his land under normal conditions. It is better to be reasonably sure of giving enough to ensure a good crop keeping in mind that an excess of plant food goes a long way towards overcoming unfavorable soil and weather conditions and with a proper rotation there is little loss from excessive fertilization within reasonable limits.

If fresh unrotted manure is to be used this should be applied in the fall and plowed under so that with the spring plowing and working it will be well incorporated with the soil and conditions approaching the clover sod obtained. If spring applications are given manure fairly well rotted and evenly applied should be used.

The potato plant can depend upon the tuber planted to nourish it for a short time only and available plant food to give the plant a strong early start is essential. The plant food in manure is available only as the manure decays; hence the importance of having in addition a sure supply of quickly available plant food as furnished by a chemical manure.

A fertilizer composed of 150 lbs. nitrate of soda, 400 lbs. acid phosphate, and 100 lbs. of muriate of potash makes a good mixture, but now that the potash supply is cut off it seems necessary to give more attention to the preserving of our liquid manures which are rich in potash, by using more absorbents in the stable and using these manures for the development of better clover crops thus making available more of the soil potash which at present may not be available.

Preparation Tillage.

Deep thorough preparation tillage should be given. No amount of after cultivation will make up for our failure to thoroughly pulverize the soil at the start to a good depth. Particularly is this so with heavy soils. It is much better to delay planting than to rush in the crop on a poorly prepared shallow seed bed. A good friable soil to a depth of 6 to 8 inches is necessary to carry the plant under average conditions. There is no way that the necessary preparation can be given as easily and thoroughly in the spring as by plowing. After plowing, if the soil has been right to pulverize properly, very little working with the harrow will be necessary and in fact tramping the team over the soil may be a disadvantage in compacting the soil again. More and better preparation tillage can be given with the plow in the same time, if the soil is just dry enough, than with any other implement

Maintenance Tillage.

The tillage required to maintain a fine surface soil free from weeds around the plant should be shallow except in the space between the rows during the early growth of the plant or until the roots have penetrated the soil. There is a general tendency to run the cultivator into the side of the rows when cultivating thereby disturbing the growing roots It is about impossible to run the cultivator too narrow after the first cultivation, depending upon the horse hoe to produce the mulch and work out weeds by carrying the fine soil from the centre of the row to around the plant

The general practice of harrowing down before the plants come up is a good one and in this way the first weeds are about all destroyed. This should be followed, however after the plants are well up with a light hilling up followed by the cultivator to loosen up the soil again between the rows. Delay in giving frequent cultivation to destroy the weeds when young may result in much hand hoeing which with the proper use of the horse hoe can be largely done away with.

The amount of hilling will be determined largely by the character of the soil. If heavy and inclined to be damp it is necessary to plant more shallow and as a consequence there will be more hilling up than is desirable on the lighter soils which in many cases will give better results with very little hilling up. A certain amount of hilling up is desirable for ease of cultivation. The usual practice of planting so that the set is three inches below the surface of the soil after it is levelled by the first harrowing will as a general thing give best results and enable one to give the hilling desired.

Seed

The importance of using seed of high vitality is great, and no amount of care in handling the soil will make up for poor seed stock. It is much better to go to considerable expense in getting seed from a good yielding crop rather than try to bring up our own stock, if it is poor, by selection. The grower should arrange in the fall for his seed potatoes for next year, otherwise he may not be able to get what he wants

It is difficult to explain why tubers of the same variety from different sources may give very different results under similar soil conditions. That such is the case is surely illustrated in the following table giving results of tests conducted at this station with Garnet Chile potatoes obtained from different growers. These different lots were grown under similar conditions and from looking at the tubers one would consider the stock all good seed

	Marketable	Unmarketable	Total.
Plot 1	220 bus.	20 bus	240 bus
" 2	94 "	26 "	120 "
" 3	212 "	14 "	226 "
" 4	186 "	20 "	206 "
" 5	26 "	10 "	36 "
" 6	32 "	14 "	46 "
" 7	176 "	34 "	210 "
" 8	52 "	22 "	74 "

It cannot be said that the Garnet Chile is run out although no doubt the grower of Nos. 2-5-7 and 8 stock would consider that it had. There seems to the writer to be no doubt that under certain unfavorable conditions during the blossoming period or about that time a check to the growth of the plant may give such results as are indicated by these poor yielding plots. This check in growth may be due to, excessive moisture; extremely dry soil conditions; intense heat, causing a wilting of the plant; disease, such as rhizoctonia and blackleg, or lack of plant food. I would not place the late blight in this list for the reason that in many cases where tubers are fairly well developed there is no apparent lack in vitality if the tubers are perfectly healthy. One or a combination of the factors named above, usually a combination, may result in degenerate stock, and in extreme cases it is not worth while to try to bring the stock to its original state by selection. It is much better to do away with it entirely and get tubers from a large yielding crop.

Selection of tubers from strong vigorous hills is advisable for in this way all plants that have a tendency to degenerate are eliminated. On the other hand it would be much better to start the selection work from Plot 1 than from plot No. 5. Selection of vigorous hills can be done only by digging the hills separately before the vines have dried up too much as the vines indicate the vigor of the plant. This vigorous growth is an indication that the plant has made its entire growth under favorable conditions eliminating the possibility of lessened vitality from the causes mentioned.

There seems to be no good reason why all the tubers from a strong hill should not have equal vitality provided the tubers are all properly matured, and it would appear from experiments that this is the case. There is certainly a variation due, no doubt, to conditions surrounding the particular plant, but otherwise the small will give equally as good results as the large tubers from such a hill. This does not make it possible for us to use small tubers from our potato bin because in the majority of cases these small tubers would be from unproductive hills; at least the proportion of small tubers from unproductive hills in the average bin of potatoes, is much greater than the small ones from productive hills. The whole idea of selection is to get tubers from plants which have made vigorous growth during their whole growing period, particularly the period during the blossoming time and the early formation of tubers.

It would seem that stock may become degenerate by unfavorable conditions in one season. At least the writer has produced a good crop of potatoes from imported stock of strong vitality the first year and a drop to less than one third the yield from tubers of this stock the next season as compared with similar imported stock.

This degeneration was due principally to extreme heat and rhizoctonia. The vitality of the tuber in the imported stock was great enough to develop a young plant which could resent these unfavorable conditions sufficiently to produce a good crop, whereas, in the case of the tubers grown from this stock, the young plants lacked the vigor to stand such unfavorable conditions. Consequently the much lessened yield. This, be it noted, was entirely a case of seed stock lacking vitality altho to all appearances the tubers were equally as good in the one case as the other.

Distance Apart.

It would seem that under average conditions the potato should be planted in rows from 30 to 36 inches apart and from 12 to 15 inches apart in the row. Varieties differ in their habit of growth, and the soil and season are also factors which enter into the matter of best distance to plant. Where modern machinery is to be used such as the planter, digger, horse sprayer, and two row cultivator it would seem that 36 by 12 to 15 inches apart is advisable. With rows closer it is difficult to work such machinery to advantage. However 30 by 15 inches is practiced by many of the best growers who think it about right. Some prefer the narrow row and the plants ranging 18 to 20 inches apart. There is a certain advantage in the narrow row in that the soil is shaded more quickly by the tops. It seems desirable that the sun's rays should be cut off from direct contact with the soil as early as possible in order to give the uniform low soil temperature so necessary for best root and tuber development.

The depth to plant has a close bearing upon the matter of hilling that is to be given and the condition of the soil. The lighter and the warmer the soil the greater the depth one can plant with safety. It would appear however that on average potato soils more than 4 inches in depth below the level of soil is unnecessary.

Seed Required per Acre.

The amount of seed per acre will vary according to the distance apart and the size of the sets used. It is desirable to use sets averaging 1½ to 2 ounces to the piece. One and one half ounce sets if planted in rows 33 inches apart and 12 inches apart in the row will require about 20 bushels of potatoes for an acre. The usual practice is to cut the sets smaller, and under favorable soil and weather conditions a smaller seed piece will give as good results. The advantage, however, of the larger seed piece comes in when conditions are not favorable for startng the plant by giving it the necessary support from the tuber planted until it is able to sustain itself from its own roots.

It seems to matter little if one, two, or three eyes are left to a set provided the seed part is not cut too small. Many eyes to a set however have a tendency to form many stalks and while the crop may be larger, more small and unmarketable tubers will result. The best growers plan on about 18 bushels of seed potatoes per acre.

The eyes of a potato will start with equal vigor from the different parts of a tuber after it is cut. If a whole potato is planted the eyes at the bud end will be the first to start and the eyes at the base in consequence of this growth may remain dormant, but, if the same tuber is cut, little if any difference can be noticed in the gowth of the eyes situated on the different parts of the potato. In fact, in many cases the end of the potato, which has few eyes, has given the best results for the reason that the sets were larger.

Keeping the Stock for Seed.

Potatoes should be carried at a low temperature in order to keep them hard, and dormant so that no vitality will be lost through sprouting in storage.

The tubers may be cut several days before planting provided they are not allowed to dry out or heat. If lime is sprinkled on the sets and the sets scattered moderately thin in a cool place they may be kept in good condition for some time. It is a safer plan to plant as soon as cut although the cutting may be done on wet days to advantage, in which case care should be exercised in carrying them without damage until they are planted.

Insects and Diseases.

The most troublesome insect is the potato beetle which is readily controlled by Paris green or arsenate of lead. The practice followed by many is to combine these two poisons by using ½ pound Paris green and 1½ pounds arsenate of lead to 40 gallons water. The advantage in this mixture is that the arsenate of lead will stick to the foliage better than Paris green.

The potato flea-beetle does considerable damage every year. It is in a measure controlled by using Bordeaux mixture in addition to the Paris green and arsenate of lead used for the potato beetle. The Bordeaux will not kill the beetles but acts as a deterrent and the plants should be kept well covered with the mixture.

Late blight has caused a great loss during the past year and the only way to prevent it is to use the Bordeaux mixture commencing about the middle of July and keeping the foliage well covered. Frequent rains may make repeated applications necessary but as a rule an application should be given every 10 days to two weeks.

Thorough applications are essential in order to protect all parts of the plant from the disease.

Early blight may result in loss making it necessary to spray thoroughly with Bordeaux as soon as the plants are nicely up. In fact, as the addition of Bordeaux to the poison for the control of the potato beetle does not add much to the expense, it is advisable to use it in these sprays. The early blight as a rule causes little damage to vigorous plants and only when the plants have been weakened by rhizoctonia is loss liable to occur.

Rhizoctonia which is a fungus attacks the base of the potato stalk soon after it begins to grow and cuts off the sap flow finally killing the stalk. A vigorous growing stalk will resist the disease somewhat. The disease may be in the soil or it may be introduced on the tuber planted. The presence of the disease may be detected by dark spots adhering to the skin of the tuber. If the tuber is held under a stream of water these spots will not wash off, but can be removed from the skin with the finger nail. If the disease is present the seed should be treated by soaking for three hours in a solution of commercial Formalin (Formaldehyde) 8 ounces in water 15 gallons. If the disease is already present in the soil such treatment will not be entirely successful in overcoming it, and it will be necessary to select a new piece of soil, one which has not previously been in potatoes, or at least for several years. This disease is in many cases responsible for the small yields in our potato fields, and responsible in part for the running out of potatoes. Hence the importance of selecting stock from hills not attacked by the disease.

Potato scab is a well known disease and can be controlled only by using disease free stock, or by treating diseased stock with the formalin solution as advised for rhizoctonia and planting on disease free soil.

FIVE HUNDRED BUSHELS OF POTATOES PER ACRE.

By M. Cumming.

How Mr. Albert C. Veinotte, West Northfield, Lunenburg County, N. S. grew last year 969 bushels of marketable potatoes on two acres of land, and during the current year, when potato yields have generally been far below average, produced over 1,000 bushels of marketable potatoes on two acres of land, is a story worth relating, not only for the sake of the interesting tale itself, but also for the impetus it should give every farmer in Nova Scotia to emulate Mr. Veinotte. There may be other farmers in the province who have grown as big crops of potatoes, but they have not come to the notice of the present writer.

Though Mr. Veinotte has not taken a scientific course in an agricultural college or school, it will be readily observed that he has put into practice the very latest knowledge which agricultural scientists have acquired. I may add, moreover, that I have learned from personal conversation with him that he is one of those far-seeing, progressive men who are not content to follow the old traditions of farming, but is ready always to adopt every suggestion or principle that science can offer whereby he will be able to maintain his position as one of the foremost potato growers of Canada. He is, in the best sense of the phrase, a scientific farmer; for he puts science into intelligent practice.

Mr. Veinotte's Potato Field.
The Highest Scoring Field in the Nova Scotia Potato Competition.

Striking Methods.

The cut which appears on this page was made from a photograph of Mr. Veinotte's 1914 field, but the description of methods applies to his practice in 1915 when he excelled even his striking achievement of the previous year and for the third time won the premier prize for potatoes in the province of Nova Scotia's field crop competition.

In November, 1914 he plowed a two-acre field that had been down two years to a clover and timothy crop, Then, as early as he could get to work on the land in the Spring, he removed all the stones; and to prevent anyone thinking that Mr. Veinotte raised his enormous 1915 crop on choice, selected ground let me add that the task of removing the stones from this two-acre field actually involved a good deal of labor. In this connection, it is worth while to state that one of my subject's neighbors kept track of the cost of clearing a piece of land for farming purposes and found it to run up to $300 per acre; yet bv good methods of farming, he made substantial annual profits on his big capitalization for clearing his land. And let me add that this man, though over 50 years of age, thought his money well invested in paying for the cost of attending two of the Winter Short Courses at the College of Agriculture, Truro.

But to get back to the story of Mr. Veinotte, his methods and achievements. As soon as the stones were picked, he harrowed the field with a heavy spring tooth harrow, and then let the land dry for a week or two. When the ground was thoroughly dry, he went over it with a heavy inthrow disk harrow, and let it dry again. Next, he went over the field with a heavy levelling harrow, and once more let it dry for some time. Still once more he disked and harrowed the field with the levelling harrow, repeating this operation once or twice until planting time.

On the first dav of June, the soil being then in a good dry condition, Mr. Veinotte rolled the field with a heavy roller. Following this, he sowed broadcast half the fertilizer he planned to use, and harrowed this in with a heavy spring tooth harrow. Next, a day later he began planting, sowing the remainder of his fertilizer in the potato drills. He used sixteen hundred pounds per acre of what is called 4-8-4 mixture of commercial fertilizer, that is, a mixture containing 4 per cent ammonia, 8 per cent soluble phosphoric acid, and 4 per cent potash. This fertilizer, which was about the highest grade offered for sale in Nova Scotia last Spring, cost him $42.00 per ton.

Mr. Veinotte prefers the Carmen variety of potatoes, and plants his seed by hand. He thoroughly believes in making a special selection of his seed, in order to insure a big crop. He recommends the selection of the seed from the hills at the time that they are being dug, and the choosing of medium-sized, well-shaped potatoes from the heaviest yielding hills. He himself does not plant very deeplv, not more than 4 inches. In his own field the potato drills were 34 inches apart and the sets were planted at 12 to 16 inches apart in the rows. When the leaves of the plants appeared just above the rows, he went over the field with hacks (hoes), so as to stop the growth of weeds, before they had become large enough to cause trouble. Immediately after this operation, he began work with his cultivator; and during the season cultivated the field again at least eight times. For in his own words, "the use of the cultivator is one of the profitable devices for the potato grower to employ, and he cannot cultivate his potato field too often."

To remove all danger of rotting, Mr. Veinotte sprayed his potatoes five times, commencing the work early in July when the plants were only 4 inches high. The last spraying was done on August 20th. The spray was what is known as Bordeaux Mxture made from 5 bs. of blue stone (copper sulphate) and 8 lbs. of lime to 40 gallons of water For the earlier sprays he added to each 40-gallon barrel ½ lb. of Paris green, to kill the potato bugs. Each time he sprayed he used slightly over two barrels of the mixture, that is, 80 gallons per acre, and during the whole summer consumed on his two-acre potato field 130 lbs. of copper sulphate. Digging was done by hand, the work beginning on October 4th and being complete on October 22nd. The result was slightly over 500 bushels of marketable potatoes per acre.

Comparative Yields.

The average yield of potatoes for Canada during the last four years (1910–1913) was 152.46 bushels per acre, according to the Agricultural Statistics of The Canada Year Book for 1914, page 144. The extra 300 bushels or so per acre harvested by Mr. Veinotte this year must be attributed to the thorough scientific methods which he adopted. When, then, one considers that throughout eastern Canada the 1915 potato crop has been light, and, moreover, when one learns that potato rot has been unusually prevalent, one must realize the big profits which were made from the extra cultivation, the extra applications of high grade fertilizer, the careful selection of seed and the thorough spraying which Mr. Veinotte asiduously devoted to his prize-winning or champion potato field. With potatoes selling at 50 cents per bushel, this extra yield was worth $250.00 per acre, an amount that would pay several times over for the additional labor involved and that would still leave a handsome profit for his purse or banking account.

To what extent Mr. Veinotte has been incited and impelled in his potato growing by the Province of Nova Scotia Field Crops Competition system which for several years has with increasing success been exploited in the province, I am unable to say. But I do know that Mr. Veinotte has inthe past three years in which he has achieved such remarkable results, been a competitor in the contests for the best acre of field potatoes, and that in this year's competition both he and his county, Lunenburg, made a clean sweep of the first prizes, though pitted against the best potato growers of Kings, Hants and Annapolis counties. I may add that Mr. Veinotte's neighbors and fellow citizens in the county of Lunenburg, are proud of his achievements and take great pride in telling others about him, his methods and results, an attitude which is in striking contrast with the spirit of envious rivalry that is sometimes evidenced. But what I would particularly signalize now is that the Fields Crops Competitions, which were instituted to incite farmers to grow the best possible potatoes, oats, wheat, turnips, etc., have already proved a notable stimulus for promoting field crop production.

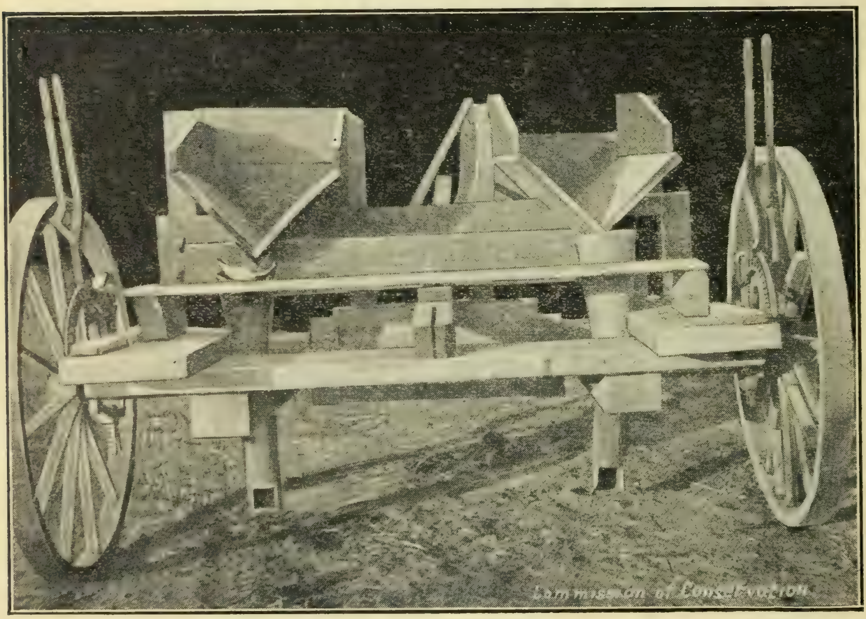
What Mr. Veinotte has achieved, could well be accomplished by hundreds of other farmers in Nova Scotia. This story is told in the hope that at least some of the other farmers will emulate Mr. Veinotte and copy his methods, and thus help to make the whole Province of Nova Scotia as famous for its total potato yield as he has made his farm.

HOW TO CONSTRUCT A POTATO PLANTER.

Description of Convenient, Homemade Instrument that any Farmer May Make for Himself.

The accompanying illustration shows a simple homemade instrument that farmers, when planting potatoes will find very convenient. The following description gives particulars, showing how the planter may be made and operated.

The main frame is 3 ft. 6 in. by 5 ft. and made of hardwood planks 2 in. thick by 10 in. wide, bolted together at the corners.



Commission of Conservation

The spouts are made of heavy gas pipe, 14 in. long and 3½ in. in diameter, tapered at the point like a cultivator tooth, so that they will not drag the sod or manure. The upper end of the tooth has a thread on it, and is screwed into a hardwood scantling 6 in. by 6 in. and 28 in. long, bolted firmly to the frame. The balance of the spout attached to the hopper is made of heavy zinc and is wider at the top for convenience in dropping in the potatos. The spouts are placed 3 ft. apart and the wheels are centered 18 in. from them, so that the one wheel comes back into its own mark, thus making all the rows the same distance apart. Should it be desired to have the rows narrower, the machine can be made on the same principle to suit any distance.

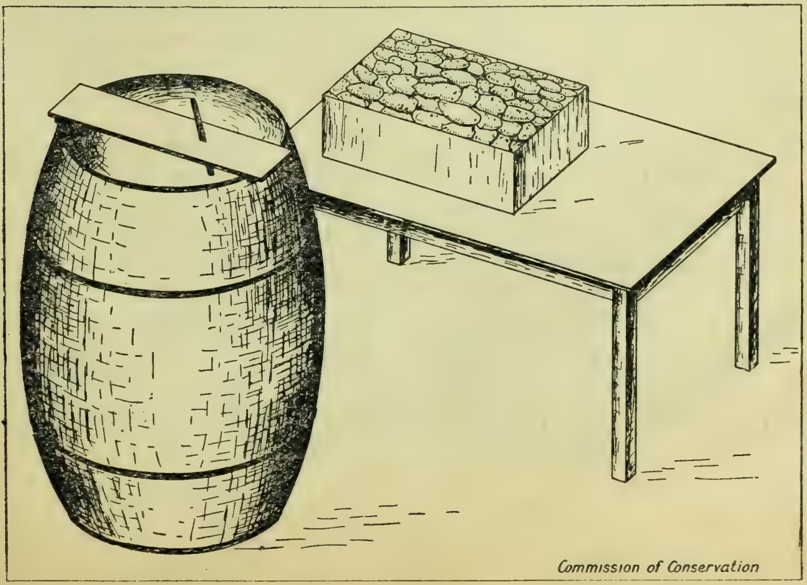
The wheels are the kind used on the old fashioned walking culvators, with levers for raising and lowering. The ratchets on the levers should be small and close together, so that they can be moved up or down any desired distance. Gang-plough wheels with rachets on the sides may also be used by elevating the frame to suit.

The wheels should be placed so that the machine will balance when two boys are sitting on the back. The boxes, holding one bushel of cut potatoes, are shaped like a mason's hod and held firmly in place in front of the top end of the spouts. The distance apart for dropping the cut potatoes is regulated by blocks, bolted on the spokes, which come in with a piece of light steel spring, which makes a noise so that the boys know when to drop the sets into the spout. A seat may be arranged directly behind the spouts for the comfort of those dropping the potatoes.

As soon as the potatoes are planted it is advisable to harrow the land so that any that are not deep enough may be covered. It is also advisable to harrow several times before the potatoes come up, the last harrowing to be just when the sprouts are appearing. The harrowing will kill weeds, and keep the crust broken to form a mulch to conserve moisture and warm the soil. In this way growth is encouraged and much time is saved in weeding of the potatoes after they are up.

DOMINION EXPERIMENTAL FARM,
Division of Illustration Stations.

Handy Potato Cutter.



Commission of Conservation

Twice the amount can be cut in a given time and the sets will be more evenly divided, if the easily made potato cutter described in the drawing shown herewith, is used instead of the old method of cutting with the knife held in the hand.

All that is required is to fasten a one-inch board, six inches wide, planed on the upper side, to the top of a barrel or box, holding it by two deep cleats or two nails. A long, sharp, thin table knife is fixed through the board in a slanting position, as shown in the illustration.

To cut, take the potato in both hands and push it lengthwise over the knife, dropping the sets into the barrel or box. Should the sets be too large, the juice of the potato will cause the two parts to stick together and they can be cut either lengthwise or crosswise as desired.

Harvesting the Potato Crop.

If potatoes have not been affected with blight or rot the best time to dig them is as soon as the tops have died, it the weather is favorable. Potatoes are dug just before fhe frost becomes severe enough to freeze the soil to the depth of an inch or so. This time of digging is usually chosen as a matter of convenience and quite irrespective of when the stalks die, as the latter dry up in many places about September, and often before. When the soil is well drained there is not much danger of injuring the crop by leaving it in the ground; but if there is no disease the sooner they are dug the better. Potatoes which have been killed by blight will usually rot as soon as the conditions are favourable, and for this reason a diseased crop is better left in the ground, as the tubers which are diseased will most of them show signs of rot before they have to be taken up on account of frost.

If diseased potatoes are dug and stored as soon as the tops are dead, the disease will be almost certain to develop in the pit or cellar, and healthy tubers will rot from contact with with the diseased ones. It is not a good practice to dig diseased potatoes early and pit them in the field. It is better to delay digging as long as possible and then put the potatoes in a cool well ventilated cellar, where the disease may be checked. Potatoes in wet soil should be dug sooner than those in that which is drier and well drained. Potatoes should be dug in dry weather, so that when they are taken to the cellar or store-room they will be perfectly dry. If the tubers are housed when wet the conditions become very favorable for the development of the disease, which may affect them and for the rotting of the healthy potatoes from contact with those thus affected.

Digging. The old-fashioned way of digging with the potato-fork is too slow and expensive a method, now that good laborers are difficult to get and wages are so high. One man with a fork will dig little more than half an acre a day, while a good potato-digger will dig from four to six acres a day. There are a number of different ways in which potatoes may be taken from the ground. Where only a small patch is grown a good potato digger is a fork-like attachment to a plough. A subsoil plough or an ordinary plough with the mouldboard removed is used for this purpose. The forks are attached to the side of the plough and extend to the rear. The prongs are made of 3-4 inch iron, 18 inches long, laid on a plate of ½ inch steel, 4 inches by 1 foot wide. This digger works much better behind the plough than those usually attached to the point of the plough Being attached to the side it prevents much clogging from the potato tops, as the rows can be ploughed from the side. Where several acres of potatoes are grown a mechanical digger becomes almost a necessity. While the outlay for a digging machine amounts to fifty or sixty dollars or more, it will harvest the crop at a much smaller cost per bushel than can be done by hand. Not only will it raise the crop more economically than by a fork or plough, but with it the grower is more likely to get his crop dug and picked up while the weather is fine, which is a great consideration.

Picking. Where large areas are grown it will be found most convenient to have a number of boxes laid here and there along the rows, just far emough apart to allow a man to dump a pailful into them. These boxes should be made strong, of light material, and capable of holding about one bushel. They can then be easily lifted by one man on to the waggon, and also carried into the cellar or store-room.

Storing. Potatoes should be stored dry, in a cool, well ventilated cellar or store-room which is perfectly dark, as potatoes soon deteriorate in quality if exposed to light. There is no doubt that great loss occurs every year from the careless storing of potatoes—by putting them in wet, in warm and poorly ventilated cellars, and piling them in great heaps. Instead of piling the potatoes against the wall or on the floor, slats should be nailed a little apart, about six inches from the wall, and a temporary floor should be laid, six inches above the permanent floor, with cracks between the boards. This will allow air to circulate around and through the pile. If the piles have to be made very large, square ventilators of wood made of slats, and running from the top to the bottom of the pile could be put in here and there through the pile. Another good plan is to keep the potatoes in large crates made with slats close enough together to prevent the potatoes from dropping through.

Thousands of bushels of potatoes are lost every year through lack of ventilation. The temperature of the cellar or store-house should be kept as near to 33°-35° F. as possible. The cooler potatoes are kept, without freezing, the better. If too warm the value of the tubers for seed is lessened by sprouting; they are also much injured for eating.

Sorting and Removing the Sprouts. A good machine can now be obtained which lessens labor considerably. The practice of the best growers is to sort and bag the potatoes just before marketing.

Marketing. There is usually more profit in selling potatoes as soon after digging as possible.

JOHN FIXTER.
Dominion Experimental Farm.

THE TURNIP CROP.

By F. L. Fuller.

Although the subject matter of this article was published in pamphlet form and issued from the Agricultural College in 1908, and revised and re-printed in the Secretary for Agriculture's Report in 1909, the increasing demand for information regarding the growth of this crop has induced me to submit to the request for another revision.

During the years that have intervened, it has been my privilege to supervise demonstration turnip plots in sections of the Province where the growth of this crop has been entirely neglected. I have also been a close observer of progress among our leading root growers. I have little that is new, to offer, but I say *emphatically* that my conviction of the comparative value of turnips as cattle food has increased. Furthermore, increased experience and observation add further evidence to my conviction that they can be easily and cheaply grown on any kind of soil, in any ordinary season. In fact, they are less affected by climatic conditions than any other farm crop.

When you add to this the fact that "By-Products" which take the place of roots are steadily advancing in price, the necessity for home production is very apparent.

With the great Nations of the world at war, the demand for greater production has touched a sympathetic chord. The farmers' response has been prompt and extensive. Obviously increased production on short notice has been accomplished, by cultivating more land.

A Boy's Prize Winning Acre ot Turnips in Nova Scotia Competition.

As live stock is admittedly the "Sheet Anchor" of Agriculture, it will be necessary to increase our Live Stock, if more extensive cultivation is to become permanent and profitable. Therefore, the most important question confronting the farmers is the economical production of "stock food". The solution of the question is to grow Turnips, and then more Turnips.

In my first pamphlet, I presented the experience of a number of farmers, in their own words. I am not going to re-print these experiences, but simply state that, from observation and conversation with these men, I learn that they are today growing from 25% to 50% more turnips than they did when they replied to my first inquiries, and the end is not yet.

What better evidence of the value of this crop can anyone give than to state the fact that our most successful farmers, who were growing five acres of turnips ten years ago, have steadily increased their acreage ever since and are making preparations for still greater areas?

Live stock men recognize the fact that, in order to put animal products on the market at the maximum profit, it is necessary to provide some succulent food during the winter months. Our winters are long; the period in which our stock get their own food, comparatively short, and the by-products, which, to some extent, take the place of succulent foods, owing to our distance from their source, are expensive.

Practically we have two crops which supply this necessary food, roots and ensilage.

While our short summer makes the growing of varieties of corn which yield a good crop of a sufficient state of maturity to make good ensilage, uncertain, except in a few localities, the conditions for growing the best possible root crops are unsurpassed.

Corn has been grown on the Provincial Farm at Truro (not the most favorable locality for this crop in Nova Scotia) with fair success for twenty years, and we do not say that it was an unprofitable crop. We do, however, emphaticallv assert that, in our opinion, it would be a great mistake to grow corn to the exclusion of roots.

When we use the term "root crops" we have turnips chiefly in mind. Mangels are scarcely better food, a comparatively uncertain crop in this province, require more labor, and are not as well adapted to all kinds of soil.

The turnips we have in mind are Rutabagas or "Swedes." A word regarding varieties. For all practical purposes, there are just two varieties "Purple Top" and "Green" or "Bronze Top Swedes." The number of named varieties on the market is accounted for by the fact that some Seedmen will start selecting Purple Top Swedes and call them "Empress," "Elephant," "Jumbo," etc. The Bronze Tops are called "Hazards, Improved" "Kangaroo", and a number of other well known names. While there may be quite a difference in the results of sowing two varieties of either Purple or Bronze Top Swedes, the difference is the result of careful selection, (by the Seedsman) in the one instance, and carelessness in the other. Therefore, the best advice I can offer is to buy from a thoroughly reliable Seedsman. Moreover, a close study of any Seed Catalogue will reveal the fact that Seedsmen advertise some named pet variety, which they put up in one pound packages, and sell for a much higher price than is asked for other named varieties they have for sale. To my mind, this means that they are taking particular care in selecting the roots which produce their pet variety and will continue to do so until it has an established reputation. For this reason, such specially named varieties are well worth the extra price charged.

Soft turnips also have a place for early feeding. They can be sown later in the season, require less care, and, under favourable conditions, give immense yields. Large quantities of them are being fed to the stock on the College farm at the present time, and are yielding forty tons per acre.

The assertion that our conditions for the growth of turnips are unsurpassed will stand the test of investigation.

Anyone who makes a careful enquiry into this question will be forced to admit that the average yield of roots in the Maritime Provinces is about 200 bushels per acre greater than in Ontario. Yet the majority of Ontario farmers would not think of trying to raise live stock without devoting a large percentage of their cultivated fields to the growth of this crop. Moreover, they do this in the face of the fact that their conditions for growing corn are more favorable than ours, and also the price of the foodstuffs which take the place of succulent foods is considerably cheaper there than here.

The Ontario men who visit our Province have been amazed at the fields of magnificent roots they have seen, and are at a loss to understand why a much larger portion of our farms is not devoted to so important a crop and we ourselves in traveling, especially through the eastern portion of the Province, were much impressed with the regrettable fact that comparatively few roots are grown.

In trying to devise some means of inducing more of our farmers to take up root growing, we were led to send out a number of questions to some of the leading root growers in different parts of the Province. Questions were sent to forty farmers, and complete answers were received from twenty-five of them.

The replies to these questions are interesting and instructive, and, as they are so in accord with our own views on this subject, and are of a nature which should inspire any ambitious farmer to greater efforts along this line they would seem to justify their publication.

Question 1 was: "How many acres of roots do you grow?" The replies varied from 1 to 15, and averaged 3 7-8 acres per farm.

For yield per acre, we have 600 bushels for the minimum and 1200 for the maximum, the average being 864.

As to cost per bushel, we received about 20 answers, ranging from 2½ to 15 cents, with 6.4 cents for an average.

Opinions as to drills and level culture only found one advocate of the latter.

Twenty-one used some commercial fertilizer, in addition to stable manure, and four used none.

The proper distance apart in the row had advocates of from 10 to 18 inches, the average being 12.4 inches.

As to methods of thinning, ten used the hoe only, and 15 used both hoe and hands.

The question as to whether turnips were fed to milking cows or not, brought out twenty-five affirmative replies.

And the question as to which was considered the better food, turnips or mangels, found four who think they are equally good; three favor mangels, two favor turnips, and six think turnips better for cattle and sheep, but mangels better for hogs.

While in some cases there were wide margins between maximum and minimum figures in reply to several questions, we wish to say that the great majority of the replies were very close to the average, thus showing a careful and intelligent consideration of the subject.

Nowhere have the farmers turned to better account the natural conditions of soil and climate than in Ayrshire, Aberdeen in Scotland and parts of Great Britain, in which the success of agriculture is dependent almost entirely on cattle, neeps (turnips), straw and cake. On one of the most noted farms in Aberdeen, visited by the writer, out of a total area of 300 acres, 65 were devoted to turnips. Moreover, I was informed that nearby farms produced even a larger proportion of this crop. A bushel of roots per head per day is the usual amount to feed in that country and it is not an uncommon thing to find feeders giving from two to three bushels per day. On straw and turnips alone cattle are largely fitted for the market. The addition of a little oil cake meal is responsible for the best beef that goes to the London Market.

As is the case on the College Farm at Truro, stable manure is the principle fertilizer used. It is usually supplemented by some commercial fertilizers. For this purpose, in Nova Scotia fertilizers containing a large percentage of phosphoric acid have given the best results. However, on many soils the addition of potash has given fair to excellent results Where stable manure is scarce and the soil in poor condition, a complete fertilizer containing the three essential elements—nitrogen, phosphoric acid and potash—should be used. For phosphoric acid, such standard fertilizers as acid phosphate, basic slag and bone meal are used. For potash, the muriate or sulphate of potash or wood ashes are used, and for nitrogen, small quantities of nitrate of soda or ammonium sulphate are used to stimulate the early growth. Farmers should, however, experiment with different fertilizer mixtures, to ascertain for themselves the most efficient fertilizer for their own farm. Where obtainable, lobster shells and rock weed have been very satisfactory.

In Denmark and other European countries, mangolds and sugar beets are grown and fed more extensively than turnips. The methods of growing are largely similar, the principal difference being in the more excessive use of commercial fertilizer. It will be generally observed that, where mangolds and sugar beets are grown to the exclusion of turnips, land is high priced, intensive farming is followed and labor comparatively cheap.

Throughout the greater part of the United States, the cheaper grown corn largely takes the part of roots. However, even in the centre of the corn belt, leading live stock men are increasing their acreage of roots annually.

Throughout Canada, the practice of growing roots is almost universal. Ontario, which is the leading live stock Province in Canada, also leads in root culture, thus showing the close relationship beween the highest class of agriculture (live stock production) and root growing. Formerly, this crop was grown in Ontario with stable manure alone as a fertilizer. During recent years the practice of supplementing with commercial fertilizer is becoming popular.

We believe that the day is fast approaching when Nova Scotia, with its superior climatic conditions, will not only equal, but lead every other Province in Canada in the growth of this crop. Furthermore, live stock production will increase in exactly the same ratio as the acreage devoted to roots, and it inevitably follows that agricultural progress will measure up to our live stock standard. Therefore, all that is necessary in order to lead Canada in agriculture is to grow a sufficient quantity of turnips.

Writer's Personal Experience.

The early part of my life was spent on a farm where turnips were considered an important crop. Among my early recollections, I distinctly remember that I did not consider sowing turnip seed, before school hours, out of a bottle with a goose quill through the cork, a fit job for a boy of my size Neither could I hurry home from school in the fall when I knew there were several cartloads of turnips to be gathered up. The farm referred to contained a great variety of soil, in fact everything from gravel to the hardest clay, and I have seen a good crop of turnips grow on every acre of it.

Furthermore, during the past few years I have had the supervision of Demonstration Turnip Plots (now upwards of twenty) in the Island of Cape Breton, and also have charge of the Boys' Turnip Competition, which this year embraced six Counties. My recent experience strengthens my earlier convictions that, in order to produce live stock economically it is necessary to grow roots, and it is universally conceded that the highest class of agriculture is live stock farming. The comparative ease with which turnips can be produced and the lack of failure under excessive climatic conditions have been thoroughly established during our recent experience. Take, for example, the present year with potatoes almost a failure, corn not a success—the average yield in the Boys' Competition, including six Counties, was nearly 750 bushels per acre. While this is a long way below previous yields; in fact, the lowest yield in the history of the Competition, yet there is no other crop which will produce an equal amount of animal food for the same outlay.

During the first two years of the existence of the Experimental Farm at Nappan, I was employed there. Colonel W. M. Blair, who was then manager, was a firm believer in root culture, and although the fields presented an unfavorable appearance, we succeeded in getting a fair crop of turnips. The turnip crop at that farm has occupied an important place in the rotation ever since its inception, and I have never seen less than 800 bushels per acre, and have seen as high as 1,200 bushels. When I took charge of the Agricultural College farm, twenty years ago, I determined to grow roots extensively, but was advised by farmers in the vicinity to go cautiously, as the soil was not adapted to the growth of roots. We began with one acre, and increased, until 1907, when Mr. Logan took charge; there was then a ten-acre field prepared for roots. At the present time sixteen acres are growing roots at the College Farm. The yield for the twenty years has averaged about one thousand bushels per acre.

Methods of Growing.

Our root crop follows a clover sod or stubble field. When we speak of clover sod, we mean a field which has grown not more than two crops of hay, often only one. If a field has grown more than two crops of hay,, it should have a grain, or some soiling crop the previous season. If a clover sod, we plough three or four inches deep as soon as possible after the clover is taken off; would then roll and harrow immediately. The rolling and harrowing early in the season greatly assists in rotting the sod and encourages the germination of any weed seeds, an abundance of which always appear to be in the soil. Later in the season, we manure at the rate of about twenty-five loads per acre and plough again, somewhat deeper than before. This time we do not harrow as we wish to leave as much surface as possible exposed to the beneficial action of the frost. If a stubble field is used, the only difference in the above treatment would be that we would disc harrow the field as soon as the crop was removed and plough once instead of twice,

Turnip crop on low drained land.

While I do not consider it necessary to manure the field in the fall, we always make a practice of saving enough manure during the summer to give our root field a dressing in the autumn.

The practice of feeding live stock, especially dairy cows, in the stable during the summer months, is becoming more common. There is no place where manure thus saved will do more good than on your next season's turnip field.

Among the advantages of a fall application are, that you get through with a lot of work when time is not as precious as it is in the spring; if the manure is coarse, it will rot during the fall and spring and give you less trouble in drilling and handling your field, and some of the weed seeds contained in the manure will germinate in the fall and be killed by the winter's frost. As soon as dry enough in the spring, the land should be harrowed. This will start the balance of the weed seeds and make a mulch, which will conserve moisture, which is usually needed by the time the turnips are sown.

If some time elapses between the time of first harrowing and sowing, the land should be harrowed again. This may seem to be a lot of labor to put on a field before planting, but it has many advantages. In the first place (if allowed an Irishman's privilege) I would say the best time to kill weeds among turnips, is when there are no turnips there. Moreover, the critical period in the life of a turnip is during the first few weeks of its growth. Nevertheless moderately early sowing (say about May 20 to June 5) has always produced bigger crops than late sowing.

By having your field in a fine state of tilth, the process of drilling and sowing is very much easier, and germination will be much more rapid and complete, thus reducing the quantity of seed required for a good stand, which means a great saving of labor during the later stages of growth.

When ready to drill, we use from 600 to 1500 pounds commercial fertilizer per acre. This may be applied by sowing broad-cast before drilling, or by sowing in the drills. I think equally good results may be obtained from either method, but valuable experiments may be easily conducted when the fertilizer is sown in the drills.

Regarding the use of fertilizers, we soon found on the College farm we were getting poor returns for the use of potash and that the best results were obtained by using mixtures containing a large percentage of phosphoric acid. Experiments along this line demonstrated the fact that, where potash alone was used, the increase in yield was produced at a very high cost, and that where acid phosphate (a purely phosphoric acid fertilizer) was used, our increase in yield cost only about three cents per bushel.

I do not wish to convey the impression that acid phosphate is the proper kind of fertilizer to use, but rather point out the probabilities of serious loss unless some means are taken to discover what element of plant food is required in your particular case. The required amount is largely determined by the state of fertility of the field to be used and the amount of stable manure at your disposal.

The important thing to keep in mind is that it costs just as much to prepare the land, sow, thin, and cultivate an acre of turnips for 500 bushels as it does for 1000 bushels. Therefore I would use all the commercial fertilizer that the increased production, as a result, would pay for at its feeding value. Do not forget that some of the plant food will remain in the soil for the benefit of succeeding crops. As this is an important phase of crop production it may be well to illustrate. Supposing without any fertilizer your acre would yield 500 bushels of turnips, and the addition of $10.00 worth increased the yield to 600 bushels, the addition of $20.00 worth increased it to 700 bushels, and the addition of $30.00 worth increased it to 800 bushels per acre. In this case, the heaviest application would be the most economical, as you would get your increase in yield at the same cost per bushel and leave your field in a much better condition for future production.

Our drills are made 28 inches apart, and, until a few years ago, we made it a practice to drill up only the number of drills we intended to sow immediately. This was done in order to give the seeds the benefit of fresh, moist earth to start germination. As this farm was badly infested with "wild mustard", I attempted to overcome it by drilling a small portion of our turnip field early in the season. This allowed all the weed seeds to germinate before it was necessary to sow the crop. When we were ready to sow the seeds, we went over the drills with a chain harrow, (a brush harrow or half a spike tooth harrow turned upside down would do) and sowed the seed immediately. This proved to be a splendid process for killing weeds; but, as the season was very dry, we had some fears lest the seed would not germinate well. To our suprise, however, the seed on this portion of the field came up much more quickly and grew more rapidly than on the adjoining portion of the field where the drills were made and the seed sown the same day. The following year we tried a larger portion of our field, with even better results, and, for the past few years, have made it a practice to handle our entire root field in this way.

This system may not be suitable for all parts of Canada, nor for all kinds of soil, but so far it has certainly proved satisfactory on the College farm.

The quantity of seed grown per acre is from 1½ to 2 pounds. This is sown from a seeder imported from Scotland, and which is the best machine of the kind I have ever seen. While I am aware that, unless you have an absolutely reliable machine, it is not safe to seed so lightly, it must be borne in mind that within the safety limit the less seed you sow the less labor you will have in thinning. I would further add that nobody should be deterred from growing turnips simply because it may be impossible to get a seeder in the neighborhood. It is not a very serious matter to sow quite a large field of turnips by hand. A bottle with a quill through the cork, or a tin can with a hole punched through the bottom, are both good devices for hand sowing. A pointed stake makes a very good implement for making a mark for the seed which can be well covered with the back of a hand hay rake.

A very good hand seeder, at a cost of about $5.00, can be obtained from the Sussex Manufacturing Company, of Sussex, N. B.

We begin thinning as soon as the third leaf is out, using the hoe only. I formerly stated that the plants should be from 12 to 15 inches apart. From recent experience, I would now recommend for beginners, at least, from 10 to 12 inches. In any event do not try to leave your turnips so close that the free use of the hoe becomes impractical. When you have to resort to hand labor, to any extent, the cost of production is largely increased. During four years' experience in scoring fields in the Boys' Turnip Growing Competition, we have found that, where the turnips were fairly close together, even though not large, the yield was always surprising, while, where they were further apart and consequently some larger ones, the yield was usually disappointing. It is easier to get 200 turnips weighing 5 pounds each on a given length of row than it is to grow 100 turnips weighing 10 pounds each on the same length of row. The most important thing about thinning is to have it done at the proper time. I have seen the yield on one part of a field at least one-third less than on another portion, simply because there was a few days' delay in thinning. In addition to saving labor, one of the chief advantages of having your field in sufficiently good shape to make thin sowing safe, is that they will stand much longer without thinning with comparatively little injury.

A detailed statement of the average cost of growing an acre of turnips is as follows:—

In the fall of 1901 a stubble field was taken and disc harrowed as soon as the oats were taken off:

1901	Cost per acre of harrowing	$ .75
"	25 loads stable manure	25.00
"	Hauling and spreading manure	8.00
"	Ploughing field	3.00
1902	Harrowing field (before ploughing)	.75
"	Ploughing	3.00
"	Preparing for drilling	1.50
"	Drilling	2.00
"	Commercial fertilizer	10.00
"	Sowing fertilizer	.75
"	Seed	.60
"	Sowing seed	.50
"	Thinning	5.00
"	Cultivating	3.00
"	Hoeing (second time)	3.00
		$66.85

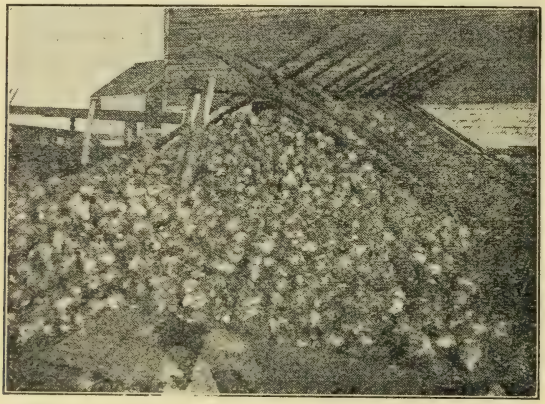
Cr.

By half value stable manure	$12.50	
" one-third value of commercial fertilizer	3.33	
		$15.83
The yield was 1,000 bushels		$51.02

which would make the cost of growing 5.1 cents per bushel. When you add to this 1 cent or less for harvesting, you still have the cost about 6 cents per bushel.

If the items of credit for manure left in the field need any explanation, I think it can be found in the fact that we expect this field to produce a crop of grain and at least two crops of hay without any further dressing of fertilizer, and then expect the field to be in as good shape as it was when we began with it. If this result is obtained, (and experience bears it out), I think our estimate is sufficiently low. That liberal allowance has been made for the other items will, I think, be generally conceded. If to anybody the amount for thining and hoeing seems small, I may state that I have, for several years, hired a man for $1.50 per day, who did his work well, and made a daily average of one-half of an acre.

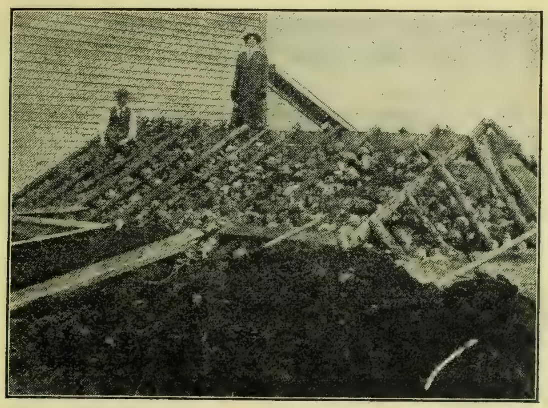
I am aware that some farmers would grow more roots if they had better cellar accomodation. Those who have basement stables, should not be confronted with this trouble. To others, I would say it is not necessary to have expensive cellars for keeping roots. The ordinary barn usually has one main driveway or floor, and a hay mow on either side, or a hay mow on one side and a stable on the other. This floor is usually several feet from the ground, and a good cellar may be cheaply made by digging out under this floor to get a sufficient depth and putting up ordinary wooden partitions next the hay mows. If a single partition is not considered safe, a double partition may be made of rough boards and the spaces between stuffed with straw.



Turnips in pit on college farm ready for covering.

On a recently acquired property in connection with the College farm it became necessary to winter some cattle in an old fashioned barn, which had no root cellar. This is what is commonly called a "bank barn." At one end, which was a few feet below the surface level, some earth was thrown out and a level space made. This was filled with turnips and then they were piled up against the barn. When the pile was complete, poles were laid with one end against the barn and the other end on the ground, just clear of the turnips. These were covered with straw and turnip leaves, or anything which would prevent sawdust, which comprised the outside covering, from working through the poles. The sawdust covering was about six inches thick, over which a few spruce limbs were thrown to keep the sawdust from blowing away. A low door from the inside of the barn to the turnip pile afforded a convenient means of getting them to the stock. Professor Trueman informed me that the total cost of material and labor would be less than $10.00 and that 2,000 bushels of turnips were kept in excellent condition during the winter.

Mr. McDonald, of Soldier's Cove, Richmond County, C. B., on whose farm we have a Demonstration Turnip Plot, had no place to store his roots. He dug into the face of a hill until the end of the excavation was about seven feet deep, filled it with turnips and covered with poles and earth, leaving holes in top for ventilation, and kept his roots in fine shape. Thus it is very evident that none need be debarred from growing roots because they have no place prepared to store them.

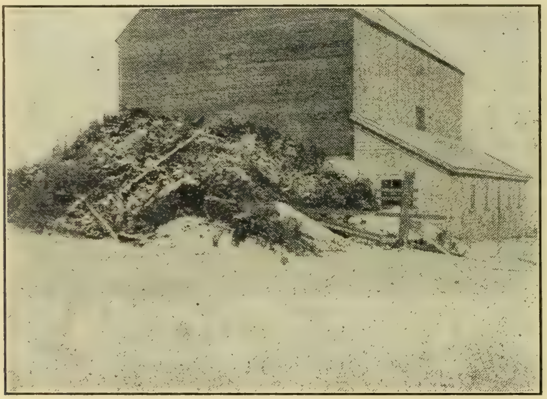


The frame work of covering for Turnip pit on college farm

Difficulties.

The chief difficulties that may be encountered in connection with growing are the ravages of the Turnip Flea Beetle, or "Turnip Fly," and Club Root. We often hear farmers say that they would grow turnips if it were not for the turnip fly. I am free to admit that I have seen small patches of turnips almost entirely destroyed by these pests, but have never seen a large field seriously affected, and am of the opinion that as a menace to root growers this trouble is more imaginary than real. Several remedies are suggested, which are more or less effectual. The best remedy is to have your field in a good state of cultivation and use good seed. The plants will then grow rapidly, and give the fly little opportunity to get in its work. It is considered by some to be a wise precaution to sow late. I do not, however, consider this necessary, and moreover if big crops are desired would not advise it, because if sown early and the first sowing should happen to be destroyed, the field can be reseeded with a good chance of success. Another simple remedy is to wet the seed with kerosene oil and dry before sowing. I have never known the "fly" to attack plants when the seed had been treated in this manner.

Club Root, once a foothold is gained, is of a more serious nature and needs to be carefully guarded against. As a precautionary measure, roots should not be grown frequently on the same piece of land. At the first appearance of the disease, the affected roots should be carefully separated and not allowed to get into the manure which is to be subsequently used for growing this crop. In every case where I have known of any serious trouble with this disease it has been on farms where roots have been grown for several years in succession on the same fields. Where a judicious rotation of crops is followed, the disease is almost unknown.



Turnip pit covered with rough boards, sawdust and brush on college farm.

Recent investigators claim that an application of 150 bushels of burned lime per acre is an absolute preventative, even on badly infected fields. The Nova Scotia Department of Agriculture is arranging for some experimental work along this line and it is hoped in the near future we will have some effective means of combatting this disease.

From close observation, I am convinced that the chief reason more turnips are not grown is the *fear* of the labor involved. Some people have a keen desire to avoid anything like extra work and would rather haul a bag of bran tied to the back of a buggy ten miles, over a bad road, than try to grow the few bushels of turnips which would take its place. Others honestly over-estimate the amount of labor required to grow an acre of turnips. To the latter class, I would recommend them to get in touch with somebody who has started growing turnips recently and has grown not less than an acre each season for two or three years.

FEEDING VALUE OF TURNIPS.

By M. Cumming.

In Denmark and other Scandanavian countries of Europe carefully conducted experiments have shown that:

1 lb. dry matter in roots equals 1 lb. corn, wheat, barley or middlings.
or 1 $\frac{1}{10}$ lbs. oats or bran, or $\frac{7}{10}$ lb. linseed meal.

In these experiments it has also been proven that roots can be used as a substitute for one half of the regular grain or short feed ration fed to cows.

Finally, an average of many analysis made by chemists indicates that 100 lbs. of average turnips contain 11.4 lbs. dry matter, a fact which may be more clearly stated as follows that 1 lb. of dry matter is contained in 9 lbs. of turnips.

From the foregoing experiments we have figures which provide a basis for making a reasonably exact valuation of the feeding value of turnips. We may proceed as follows:

1 lb. dry matter in roots	equals	1 lb.	middlings
i. e. 9 lbs. turnips	"	1 "	"
Therefore 60 lbs. (1 bus)	"	6 2-3	"

Now middlings on the average cost nearly $30.00 a ton, at which rate 6 2-3 lbs. middlings are worth 10c. Therefore 1 bus. of turnips has a feeding value in comparison with the ordinary mill feed of about 10c a bushel.

It will be observed, however, that turnips cannot be used to completely take the place of the grain ration. They can be used at about the above rate (i. e. 9 lbs. substituted for 1 lb. middlings,) up to theextent of one half of the grain ration It must not, however, be forgotten that an additional value, which is difficult to state in terms of dollars and cents, must be put on turnips because of their healthful effect on animals, a matter which need not be more than stated to be appreciated. Suffice to say that cattle that would become quite unthrifty on dry hay and straw will become quite the opposite when a moderate quantity of turnips or other roots are added to this dry ration.

Before concluding this comparison we present the following figures to show the feeding value of an acre of turnips compared with an acre of oats. For the purpose of this comparison we will have to assume that a field which would produce about 800 bushels of turnips would produce 75 bushels of oats.

Now 800 bushels of turnips will weigh 48,000 lbs. of which 11.4% is dry matter so that this acre of turnips will contain 5,472 lbs. of dry matter.

According to our former table.

1 lb. dry matter in roots equals 1 $\frac{1}{10}$ lbs. oats.
Therefore 5,472 lbs. in roots equals 6,019 lbs oats equals 177 bus.

This amount, even if we allowed for the feeding value of the straw is more than double that of our 75 bushel field of oats. It will, therefore, be seen that on those farms where only a limited amount of land is available or where, for purposes of economy, the biggest returns must be secured from a given application of manure or fertilizer, the owner is wise who devotes a very considerable acreage to turnips, a conclusion which becomes all the more irresistible because of the fact that in no other part of Canada will turnips grow so well as in the Maritime Provinces.

This series of articles will be continued in a subsequent report.

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Annual Report

OF THE

SECRETARY FOR AGRICULTURE,

NOVA SCOTIA

FOR THE YEAR 1916

(*Printed by Order of the Legislature.*)

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AGRICULTURE

REPORT OF THE SECRETARY FOR AGRICULTURE FOR THE YEAR 1915.

The Honorable George H. Murray,

Provincial Secretary.

Sir:—In accordance with the requirements of the Act for the encouragement of Agriculture, I have the honor to submit my Annual Report for the year 1916, which contains a statement of the work done during the year under the provisions of the Act and by authority of His Honor, the Lieutenant Governor-in-Council.

This report embraces the following documents:—

Part I.—My Annual Report as Secretary for Agriculture for Nova Scotia. P. 1.

My Report as Principal of the Agricultural College, Truro, being the twelfth Annual Report of the Nova Scotia Agricultural College and Farm. P. 20.

Report of the Professor of Botany. P. 27.

Report of the Provincial Entomologist and the Professor of Zoology. P. 39.

Report of the Professor of Horticulture. P. 59.

Report of the Farm Superintendent and Professor of Agriculture. P. 80.

Report of the Superintendent of the Poultry Department. P. 101.

Report of the Superintendent of Dairying. P. 112.

Report of Chemist. P. 1132.

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Part II.—Report of Agricultural Societies, Associations, Exhibitions, Meetings and Field Crop Competitions. Pp. 1 to 139.

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I have the honor to be, Sir,

Your obedient servant,

M. CUMMING,

Truro, Feb. 1st, 1917.

Secretary for Agriculture.

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Errata.

Page 1, line 7. For 786,633 read 936,633.

Page 7, line 14, read as follows.

The five year averages for exports of apples from three principal ports of export from Nova Scotia for the thirty years preceding 1910 were given as follows:

1880-85	30,320	barrels.
1885-90	83,356	"
1890-95	118,552	"
1895-1900	261,879	"
1900-05	377,225	"
1905-10	496,655	"

Taking 50 per cent. as the probable rate of increase for the immediate future Mr. Eaton estimated that the average annual export for the next few years would be as follows:

1910-15	744,982	barrels.
1915-20	1,117,473	"
1920-25	1,676,209	"
1925-30	2,514,413	"

The average annual export of apples from these three ports for the first period, 1910-15 has been about 725,476 barrels, or an increase of about 46 per cent. It should be stated, however, that during this time a considerable export trade in apples has grown up with the Canadian West, with Quebec and Newfoundland which is not included in these figures and which would bring the increase well above the 50 per cent. mark.

PART I.

AGRICULTURE.

REVIEW OF THE WORK OF THE AGRICULTURAL DEPARTMENT OF THE GOVERNMENT OF NOVA SCOTIA.

The Honorable George H. Murray,
Provincial Secretary,
Halifax, N. S.

Sir:—

Judged by the production of the farms and the financial returns, agriculture in Nova Scotia knows nothing of the Great War. True, boys have gone to the front and are missed, news of fallen heroes has brought sorrow in its train, prices of commodities bought and sold have increased and the labor problem is becoming more and more acute. None the less, agriculture in Nova Scotia, after two and a half years of war, has in the main been so little affected that one wonders if ever anything could happen to permanently retard its progress. The report of 1915 was prefaced in a similar strain and it looks as if succeeding years, should the war continue, will record a like state of affairs. Such is the solidity and permanency of agriculture.

The products of the farm for 1916 were fully up to those of 1915 and their value in the aggregate was increased by at least as much as would pay for the increased cost of production and of living brought about by the war. More over, it has been a year the outcome of which should stimulate the farmer to exert even more effort than before to produce maximum crops in 1917. For such crops the country has great need and the markets of the world have proven themselves ready to pay the highest prices. Looking backward, the farmer who was patriotic enough to produce has reaped a personal reward. Looking to the future, he is prompted to leave nothing undone that will help to realize "Bigger Crops Still in 1917." This report, like that of preceding years, is written in the hope that it will stimulate better direction of effort to the end that the farms may yield their full fruition and so add to the real wealth of the country, an accomplishment of inestimable value if we are to contribute our share towards the war.

The Report includes three parts as follows:

Part 1 —The General Report of the Secretary for Agriculture, and reports of the various officers of the Department and of the College of Agriculture.

Part 2 —Report of the Superintendent of Agricultural Societies and Associations and Exhibitions, dealing with (a) Agricultural Societies, (b) County Farmers' Associations, (c) County Exhibitions , (d) Field Crop Competitions and Field Demonstration Work.

Part 3 —A series of educational articles on "Orcharding in Nova Scotia," edited by P J Shaw. A similar series was issued in 1910 but the present series has been elaborated and brought up to date.

SEASON OF 1916.

A season free from extremes of all kinds and, on the whole, favorable for farming, was that of 1916. Hay blest with bountiful rains during the growing season was harvested in drought, and as a result both in quantity and quality was a record crop, even exceeding the unusually large crop of the preceding year. Early seeded cereals, oats, wheat, etc , on well drained land were almost equally good, and even on the heavier and later seeded land were for the most part fully up to average. Potatoes, a signal failure in 1915 were in quantity and quality almost a record crop in the season just past. The later harvested crops like mangels, turnips, etc , owing to continued dry weather during August and September were considerably reduced in yield. Pastures were most luxuriant up to the first of August, but from then until the end of October were extremely bare, since which time they improved a good deal. Apples, unfortunately did not produce any better than in 1915, so that for two successive years the growers have harvested crops little more than a third the quantity of the record crop of 1911. The only fortunate features are the superior quality of the fruit, especially from sprayed orchards, and the higher prevailing prices.

It was a good year for live stock of all kinds. The dairy cow has again taken the lead, but in some sections beef raising stimulated by high prevailing prices has taken on new life, and never for years have sheep proven so profitable to their owners. Up to the first of August all live stock dependent on pastures gave unusually large returns. Since that time the protracted drought of August, September and October made pastures so bare that farmers were either compelled to draw upon their winter stores of feed, or to let their live stock go back. Nevertheless, the general report is that live stock went into winter quarters in better than average condition.

On well drained farms seeding began very early, and conditions for seeding remained good up to nearly the end of May, after which time there was a continuous succession of rains which made it impossible for farmers on their heavy soils to get their crops in until it was too late to expect large returns. On the College Farm at Truro the first oats were sown on April 24th in comparison with April 29th in 1915, May 13th, 1914, and April 20th in 1913 Haying began on the College Farm on July 11th, two days earlier than in 1915, and two weeks earlier than in 1914.

The season was unusually free from frost At the College Farm, Truro, the last frost of the Spring was on May 22nd. On Sept. 4th there were three degrees of frost, and on Sept. 20th the thermometer was just at 32 degrees. Neither of these frosts did much damage, there being no seriously damaging frost until Oct. 12th, when the thermometer fell to 19 degrees. The rainfall of May was just moderate, but in June and July, rain was registered on 34 out of 61 days, this being largely responsible for the luxuriant growth of the early part of the season. August and September up to the middle of October was an unusually dry period, extremely favorable for harvest, but very unfavorable for growing crops.

FRUIT.

This has been another disappointing year for the fruit grower of Nova Scotia. While there is a considerable difference of opinion, some of the best posted men estimating a yield of 100,000 barrels less than in 1915, yet the average of the estimate of all who have reported indicates that the yield was practically the same as for 1915. The estimate of Mr. G. H. Vroom, Dominion Fruit Inspector, agrees with this. One well informed correspondent states that there were 575,000 barrels of shipping apples, 60% of which will be sent to England, the balance going to Newfoundland and to New Brunswick, Quebec, and Western Ontario.

The redeeming feature of the year has been the superior quality of the fruit, especially from sprayed orchards, and the higher prevailing prices. While some growers have received small returns indeed from their trees, there are some who have never netted bigger returns.

Different reasons have been assigned for the light crop. No doubt the season has had something to do with it. Nevertheless, we have records of orchards which have for years been well fertilized, cultivated and sprayed and which gave practically as large yields in 1916 as in any other year. No doubt, on some of the lower levels where frost did actual damage, the weather conditions were, in the main, the cause of the failure of trees to produce, but the best fruit growers are of the opinion that with these exceptions, seasonal differences can be and in many cases are largely controlled by spraying, cultivating and fertilizing. While, therefore, one may be right in saying that the season was responsible for the light yield, it would seem to be more exact to say that the season, combined with lack of care of the orchard in the previous as well as the current year, were the real causes, and this seems to be the best summing up of 1916.

Plums, cherries and pears were nearly a complete failure, producing only from 50 to 65% of the yield of 1915, which was in itself a poor year. Cranberries yielded about 80% of 1915, but strawberries, gooseberries and similar small fruits produced from 5 to 10% above the average of 1915.

The following table contains a record of the maximum and minimum temperatures for each month of the year, and of the precipitation for each month and for comparison a corresponding record for 1915. These records were taken at the College Farm, Truro, which is in the centre of the Province. Corresponding records at the Meteorological station at Halifax show a 50% heavier precipitation.

MONTH	Temp. Maximxm	Temp. Minimum	Precipitation	
			1916	1915
December 1915	54.0	6.0	4.29	3.90
January 1916	55.0	–20.0	2.60	3.71
February "	62.0	–28.0	2.12	2.62
March "	49.0	–15.0	2.00	1.45
April "	55.0	17.0	3.10	2.19
May "	67.0	23.0	1.48	3.79
June "	80.0	34.0	2.07	2.92
July "	86.0	40.0	3.46	2.55
August "	84.0	34.0	2.20	5.64
September "	78.0	29.0	1.00	1.65
October "	68.0	17.0	4.30	5.15
November "	63.0	–6.0	2.50	3.65
			31.12	39.22

CONDITIONS AND NUMBERS OF LIVE STOCK.

This report is at best an estimate. Nevertheless such a large percentage of crop correspondents report an increase in all classes of live stock that one seems bound to accept the conclusion that during the year the increases recorded in the table below have actually been made. However, the high price which farmers have to pay for mill feeds and grain of all kinds is causing them to part too readily with any class of live stock which the butcher will take, the result of which is likely to be a considerable decrease before the Spring of 1917 arrives. The markets for all classes of live stock and live stock products, with the exception of the horse, have been excellent, and promise to continue at the high water mark. From every part of the Province correspondents state that farmers have a surplus of horses, for which they would like to have a market. The average in numbers of the various classes of live stock in comparison with 1915 is reported as follows:—

Daily Cattle	104 per cent.
Beef Cattle	107 " "
Horses	105 " "
Sheep	103 " "
Hogs	104 " "
Poultry	106 " "

TOTAL YIELDS FOR 1916.

The following table contains the *Estimated Returns* of the various crops in the Province during 1916. This is based upon the Dominion Census returns of 1911, and the estimates of acreages and yields for the current year as made by the crop correspondents.

Crop	Acres	Yield per acre Bushels	Total Yield Bushels
Oats	128,390	37	4,794,430
Wheat	18,550	23	426,660
Barley	5,978	28	167,384
Buckwheat	11,575	21	243,075
Peas	213	17	3,621
Beans	1,065	21	22,365
Rye	1,112	19	21,128
Mixed Grains	4,443	33	146,619
Corn of Husking	156	43	6,708
Potatoes	33,996	210	7,139,160
Turnips	12,484	550	6,866,200
Mangels	1,256	470	590,320

		Tons	Tons
Hay	515,310	2	1,030,620
Corn for forage	780	12	9,360
Other forage crops	1,502	12	18,024

Other Roots:—

Carrots, Parsnips, Beets	1300
Apples	600,000 barrels.

Striking features in the above table in comparison with the corresponding table published in 1915 are nearly a 100,000 ton increase of hay and a 3,000,000 bushel increase in potatoes.

NUMBERS OF LIVE STOCK IN NOVA SCOTIA.

Horses	73,914
Milch Cows	151,378
Other Cattle	174,317
Sheep	233,198
Swine	62,523
Poultry	1,203,969

The value of the Field and orchard crops calculated from the prevailing market prices is $25,886,962. If one were making a full valuation of the farm products of the year, he should add to this 50% of the receipts from such live stock products as milk, butter, wool, lamb, etc., a large proportion of which are produced on pastures of which no reckoning has been made in the above table. Moreover, there should be further added an estimate of the profit made from feeding purchased and home grown feed to live stock. The additional income estimated on these scores is $8,000,000. The estimated returns, therefore, for Agriculture in the Province of Nova Scotia for the year 1916 is placed at $33,886,962.

COLLEGE OF AGRICULTURE AND FARM.

The attendance in the regular classes at the College of Agriculture is 54 in comparison with 114 before the war broke out. In the Short Course held in Jan. 1917, the attendance was the largest in the history of the College, somewhere between 400 and 500 having attended some or all the classes and there being an average attendance of 250. This was advertised as a "War Time Short Course," provided to meet the needs of the farmer who could only leave home for a short time and intended to stimulate greater agricultural production in 1917. A Women's Short Course attended by 41 was held at the same time and proved equally successful.

The Farm and its live stock were never in a more satisfactory condition. Perhaps the biggest improvement however, has been made in the Horticultural Department, which has been extensively developed and now ranks as high in equipment and as efficient in work as any other department at the Institution. The completion of the new Science Building, in addition to providing additional teaching facilities has made it possible to carry on extensive investigation work in Chemistry, Entomology and Plant Pathology, reports of which are presented in this publication

It will pay the reader who is interested in Agriculture to read in the subsequent reports all that is being done in the various departments of the College. The reader who does so will learn that the Nova Scotia Agricultural College is now a mature institution composed of efficient departments all of which are being conducted for the united purpose of developing agriculture in Eastern Canada.

THE NOVA SCOTIA FARMERS' ASSOCIATION.

The 1916 meeting of the N. S. Farmers' Association was held in Windsor. The 1917 meeting will be held at Amherst This Association issues a separate report which may be secured on application to C. R. B. Bryan, Secretary N. S. Farmers' Association, Truro, N. S.

COUNTY FARMERS' ASSOCIATIONS.

In 14 out of 18 counties of the Province there have been organized County Farmers' Associations, all of which are branches of the larger Provincial Farmers' Association. During the current year, two new Associations were organized, namely, for Guysboro and Victoria Counties. A detailed report of the work of these Associations will be found in Part 2 of this publication.

THE NOVA SCOTIA FRUIT GROWERS' ASSOCIATION.

This Association is the Parliament of the fruit growers in the same sense that the Farmers' Association is the Parliament of the general farmers of Nova Scotia. The 1916 meeting was held at Wolfville and the 1917 meeting at Lawrencetown. A separate report is annually published which may be secured on application to M. K. Ells, Secy. Port Williams, N. S.

THE DAIRYMEN'S ASSOCIATION OF NOVA SCOTIA

This is one of the newer Associations of the Province having only passed its fourth birthday. This Association stands behind the most important line of development in the agriculture of Nova Scotia, namely, Dairying. The membership is composed of the managements of the creameries and cheese factories and the butter and cheese makers in the factories of the Province. That the Association has done good work will be ascertained by reference to the report of W. A. MacKay, Dairy Superintendent of the Province, which report will be found in a subsequent part of this publication.

THE NOVA SCOTIA POULTRY ASSOCIATION.

This Association is now in its sixth year. Up to the present time the major work of this body has had to do with encouraging poultry shows throughout the Province. The Secretary, is J. P. Landry, Poultry Superintendent for the Province, in whose report a detailed statement will be found of the work which this Association is doing.

THE NOVA SCOTIA ENTOMOLOGICAL SOCIETY.

This Society is not yet two years old. It has held two Annual Conventions. A separate report is annually issued which may be secured on application to the Secretary, W. H. Brittain, Provincial Entomologist, Truro.

AGRICULTURAL SOCIETIES.

An increase of 16 is recorded in the number of Agricultural Societies organized in the Province during the year. This brings the total number up to 263, an increase of 103 over ten years ago. During the year, 19 Societies were organized; 2 were resuscitated; 5 failed to reorganize. A full report on these societies and their work will be found in Part 2 of this publication.

EXHIBITIONS.

The Provincial Exhibition held at Halifax in September, recorded the largest attendance for a number of years. There were also held during the year 13 County Exhibitions, which, without exception, were better attended and presented larger exhibits than in any previous year.

In addition to these exhibitions, 6 Seed Fairs were held, and 7 Poultry Shows, beside a number of School Fairs held in the various counties of the Province.

Owing to the building being used for war purposes, the Maritime Winter Fair, Amherst, an annual institution, was not held in 1916.

The reports of the County Exhibitions and of the Seed Fairs will be found in Part 2 of this report. The report of the Poultry Shows will be found in the subsequent report of J. P. Landry, Poultry Superintendent. The report of the School Fairs will appear in the report of the Supt. of Education.

MEETINGS.

In the old days, it was the recognized procedure to hold series of meetings without any definite aim in view except the betterment of agriculture in every part of the Province, But now that creameries and co-operative associations and similar organizations have sprung up in the various counties of the Province, most of the meetings held are under the auspices of these bodies and are held for some definite and specific purpose. Added to this, the Short Courses and various demonstrations have taken the place of many meetings heretofore held. A definite report of all the meetings held under these various organizations has not been preserved. It is worth noting, however, that since for the most part the meetings held have been for some specific purpose, there has grown up among the farmers a greater respect for and appreciation of the value of such meetings as are held.

FIELD CROP COMPETITIONS.

The Field Crop Competitions are accomplishing much in educating farmers to the value of improved seeds and better methods of cultivation. A full report of these competitions for the year 1916 will be found in Part 2 of this report. There was a small increase in the number of entries and a much bigger increase in the quality of all the crops entered for Competition. Competitions were held in the growing of oats, wheat, potatoes and turnips.

As in former years, the Seed Division of the Federal Department of Agriculture has provided a substantial subvention to help in paying prizes to the winners of these competitions and also to meet the expenses of the Winter

Seed Fairs which are a natural sequence to these competitions and in addition, Mr. S. J. Moore, who represents the Seed Division, of the Federal Department of Agriculture, devotes all the time he can to promoting these crop competitions and seed fairs. I am pleased to publicly recognize in this report the appreciation which the farmers of Nova Scotia and the Department of Agriculture of the Province of Nova Scotia have of the co-operative assistance which has been received from the Seed Division at Ottawa.

The Boys Turnip Growing Competitions, inaugurated some five years ago through the generosity of an ex-Nova Scotian, now living in New York, were continued during the year. These Competitions have been in part financed by the Department of Agriculture and in part by private contributors, headed by the aforementioned Nova Scotian New Yorker. From personal observation, I can report that few competitions have proven of as great importance in stimulating young farmers to grow more roots and to improve their farms. The only regret is that these competitions have not been more extensively participated in. For a full report see Part 2 of this publication.

DAIRYING.

Substantial progress is again reported from the creameries of Nova Scotia, the output of which was 25% in advance of 1915. This means that for the past seven years there has been an average increase of something over 30% in each year in comparison with the previous year. Unfortunately we are not able to secure statistics giving the product of the home dairies but there is every reason to believe that there has been some increase in the home production although not so large as in the production of the factories. Details will be found in the report of W. A. MacKay, Dairy Supt. in the subsequent pages of this publication.

CO-OPERATION.

The co-operative movement is gaining headway in many parts of the Province. While the Government has passed the necessary legislation, its officials have not actively participated in the movement, except in so far as their advice was sought. There are upwards of forty associations in the Annapolis Valley and adjoining districts incorporated under "The Farmers' Fruit, Produce and Warehouse" legislation of 1908. The majority of these carry on their business in the main through the United Fruit Companies a central organization, which was found necessary in order that buying and selling might be done to the best advantage.

The manager of this Central organization is A. E. MacMahon, Berwick, N. S., and the Secretary J. N. Chute, of Berwick, N. S. There are a few co-operative associations which have not united with this central body.

The movement is now making progress in other parts of the Province, notably in Inverness, Cape Breton, Antigonish and Pictou Counties. In some of these counties small local associations have been formed under the provisions of a special Act passed in 1914 "To Encourage the Incorporation of Farmers' Co-operative Societies" but in Pictou County and possibly elsewhere larger associations have been formed under the provisions of the 1908 "Fruit, Produce and Warehouse" legislation. At the time of writing it looks as if extensive developments along these cooperative lines will be made in the near future.

STALLION ENROLMENT.

In the years 1912, and 1913, legislation was passed requiring the owners of stallions to enroll them with the Nova Scotia Department of Agriculture. The aim of this legislation was to effect improvement in the stallions owned in the Province along the same lines as in some of the larger provinces of Canada and states of the United States. At the conclusion of this paragraph there is presented a summary of the enrolment for the year 1916.

While in our opinion this law is responsible for some extra pains being taken to improve the stallions of the Province, yet in the main it has not accomplished as much as we hoped for. Possibly the temporary depression in horse prices has had something to do with the partial failure, but in general there is no doubt that the rank and file of the horse breeders of Nova Scotia still fail to appreciate the extra money they would receive if they would adopt as their standard "Breeding only to the best."

The following is a summary of the enrolment for 1916:—

From	1	Pure Bred, Inspected, Sound	27
	2	Pure Bred, Inspected, Unsound	2
	3	Pure Bred, Not Inspected	46
	4	Grades, Inspected, Sound	14
	5	Grades, Inspected, Unsound	3
	6	Grades, Not Inspected	50
	7	Crossbreds, Etc, Inspected, Sound	10
	8	Cross Breds, Etc, Inspected, Unsound	0
	9	Cross Breds, Not Inspected	54
			206

PURE BREDS.

Clydesdales	35
Standard Breds	25
Hackneys	5
Percherons	6
Thorough Breds	1
French Coach	1
French Canadian	1
Morgan	1
	75

HORTICULTURE AND MODEL ORCHARDS.

No new model orchards have been set out during the year, but an effort has been made to extend the influence of the work which was contemplated when these orchards were first provided for by carrying on demonstrations in neglected orchards and also by encouraging orchardists and general farmers as well to make a greater attempt at gardening. A full statement of this work will be found in the subsequent report of the Horticulturist.

WHEAT GROWING IN NOVA SCOTIA.

By reference to the Annual Report for 1915, the reader will find that a considerable effort has been made during the past two years to develop wheat growing in the Province. The policy seems to have borne some fruit, for there has been a substantial increase in the acreage of wheat and at the present time there is a larger demand than ever for wheat seed. The Government owns and operates a cereal mill at Baddeck which is doing good work for the farmers in the vicinity of the Bras d'Or Lakes. How much furthere the Government should go in assisting the construction of new mills and the improvement of mills already in existence is a serious question. In the meantime the Department is making a special effort to insure a reasonable supply of first quality seed for the season of 1917. The Department has been aided in this policy through an agreement with the authorities at Ottawa which permits us to use for 1917, a part of the money appropriated under The Agricultural Instruction Act at Ottawa.

INSECT PESTS AND PLANT DISEASES.

Very substantial progress has been made during the past year in the work conducted by the Provincial Entomologist, W. H. Brittain, whose report will be found in Part 1 of this publication. Despite a thorough search over 3000 less Brown Tail moth nests were taken than in the previous year. Nevertheless, Mr. Brittain expresses fear that this serious pest may yet get past Kings County and into Hants and adjoining counties, where it may have a better chance to thrive and he, therefore, urges the continuance of aggressive work to suppress this pest.

In Mr. Brittain's report will be found a reference to the Green Apple Bug and the Apple Maggot, which have proved serious pests to the fruit growers of the Valley. Bulletins nos. 7 and 8 dealing with these insects have just been issued and are available for distribution.

A most commendable feature of the work for the suppression of insect pests is the co-operative support which is received from the Dominion Government Entomological Branch.

Included with the Entomologist's report is a report of the recently appointed Provincial Apiarist, C. B. Gooderham, who gives a report of his inspection of 1554 colonies of bees, among which he discovered only 45 diseased colonies, a very satisfactory report indeed., for it was anticipated that a good deal more disease would have been found. The services of the Provincial Apiarist are now available to any who may wish advice and assistance in the important subject of Bee Culture in the Province.

WOMEN'S INSTITUTES.

Five new Institutes were organized during the year bringing the total number for the province up to 49. The membership is approximately 1600. During the year these Institutes contributed $8,333.12 to various charitable and patriotic purposes besides forwarding many boxes of clothing and provisions to the soldiers over seas. A full report of the activities of these Institutes will be found in the report of Miss Jennie A. Fraser which appears in a subsequent part of this publication.

FEDERAL APPROPRIATION TO THE PROVINCE UNDER THE AGRICULTURAL INSTRUCTION ACT.

Under the provisions of the Agricultural Instruction Act of 1913 the Province of Nova Scotia received from the Dominion Government at Ottawa for the year 1916 pursuant to agreement between the Honorable and Minister of Agriculture for Canada and the Honorable the Provincial Secretary for Nova Scotia the sum of $74,859.28. The agreement provided for the expending of this money as follows:

Agricultural Colleges and Agricultural Schools:—		
(a) Capital expenditure to pay interest and sinking fund on cost of construction of and furnishing for science building	7,500	
(b) Salaries and maintenance	23,000	$30,500.00
Instructors, Directors, Superintendents and District Representatives Salaries and Expenses		7,500.00
Instruction and Demonstration:—		
Dairying	3,500	
Poultry	1,600	
Bee-keeping	800	
Soils (including drainage and field crops)	3,000	
Horticultural and Entomological Investigation	8,000	
Fruit growing	1,000	
Short Courses	3,000	
Women's Work (Women's Institutes, Home Makers' Clubs, Domestic Science etc.)	3,000	
Bulletins, reports, circulars, and miscellaneous printing	800	
Instruction in Public and High Schools and in Normal Schools in Agriculture, Nature Study, training of teachers and school gardens	11,000	
Contingencies and miscellaneous		1,159.28
Total		$74,859.28

The following balances were carried over from 1915:

District Representatives etc	20.12
Dairying	.59
Poultry	66.50
Bee-keeping	26.87
Soils	6.70
Fruit Growing	225.75
Short Courses	56.04
Women's Institutes	1350.41
Bulletins	
Rural Science Schools	972.41
Contingencies	8.72
Total	2714 11

This Federal Appropriation which began in the year 1912 has proven invaluable to myself and my colleagues in our efforts to promote agriculture in the Province of Nova Scotia. Since the Federal Appropriation was first granted the activities of the Nova Scotia Department of Agriculture have been nearly doubled, and I think that anyone who studies the work will agree that the results have been at least commeasurate. It is difficult, in a formal report, to make a statement that will do full justice to the use that has been made of this special agricultural appropriation. However, in the following paragraphs the reader who is interested will find an outline of the purposes for which the money has been used, and should further details be required I will be very pleased indeed to furnish them.

Capital Expenditure.

In 1914 arrangements were made to capitalize a part of the Federal Appropriation, and to use the money for the erection of a Science Building which was very much needed in the equipment of the Agricultural College. The building is now completed and has been occupied for over a year by the Departments of Chemistry, Entomology, and Domestic Science. Anyone who is conversant with the work at the College will appreciate the advantages which have been received and the opportunities for public service which have been given through providing these Departments with proper working equipment. In fact nothing more is needed to appreciate the result than a reading of the subsequent reports of the Chemistry and the Entomological Departments.

Salaries and Maintenance, Agricultural College.

The College at Truro differs from most of the Canadian Colleges. It provides a two years course in agriculture, calculated to fit its students for farm work. Most of the Colleges offer a four year course, the last two years of which are devoted in the main to preparing students for professional work. At the present time the Nova Scotia College has made arrangements with such Colleges as MacDonald and Guelph by which its two year graduates may enter the third year at these Institutions and complete their work there. From the fact that the amount of teaching which is done at the Nova Scotia College under this system is much less than if a four year course were conducted, the members of the staff have time, in addition to their college duties to promote agricultural measures in every locality of the province. For this reason the grant received out of the Federal appropriation for salaries and maintenance at the Agricultural College should not be considered as being spent wholly at Truro, but in reality as being spent in every part of the province. The grant has made it possible to secure as capable men for the College positions as could be secured, and it has also made possible the employment of assistants who relieve the head men of much routine work and so give them more time for extension work in the various counties of the province. In this way the senior teachers at the Agricultural College are reasonably free to teach at short courses throughout the province, to address meetings, to attend various functions held by farmers and generally to promote agricultural activity everywhere.

Instructors, Directors, Superintendents and District Representatives.

Six men, sometimes aided by assistants, have during the past year been engaged in agricultural demonstration work in the Cape Breton Counties and in Antigonish and Guysboro. Their salaries and expenses and the cost of materials used have all been paid for out of the Federal Grant. Some of the materials they have used were lime and fertilizers for soil tests; improved wheat, oat, potato, turnip, and other seeds and fruit trees for experimental and demonstration purposes. In Guysboro County a grain separator was purchased and farmers will use it this year to separate some of their home grown oats and wheat for seeding purposes, an extremely important matter in the light of the excellent results which have followed the use of home grown acclimated seeds instead of imported seeds. Also a Clover

Huller, the only one in the province, was purchased two years ago to be used not only in the counties in which there are district representatives but in other counties as well. In one centre of Kings County something like eight thousand pounds of clover seed was threshed with this machine, and it is anticipated that from fifteen thousand to twenty-thousand pounds, worth five thousand dollars or more, will be threshed in the province before the season is over. Anyone who knows the value of clover will realize the importance attached to this work which has already demonstrated the possibility of farmers growing at least their own clover seed. In the Cape Breton Counties, while something has been done to promote every phase of agriculture, the greatest work so far has been the promoting of turnip growing with a view to providing more feed for cattle and so giving an incentive to increase the live stock holdings of the farmers of this part of the province. It is impossible in a brief space to specify in detail all the work which has been done, but one of the really striking things was brought to light when last year, for the first time, the farmers of Isle Madame in Richmond County, shipped vegetables to Sydney, whereas in years gone by it has been their practice to import vegetables. While it will be many years before the fruition of this demonstration work will be harvested, yet the beginnings of the harvest are now in sight and we hope, when the war is over, and men can be secured, to develop this phase of the agricultural policy to a much larger extent. The men employed in this work during the passed season were as follows:

In the Cape Breton Counties, H. S. Cunningham (Head of the work) H. B. Langille, T. H. Munn, and Father Robitaille; in Antigonish Dr. Hugh MacPherson; and in Guysboro A. B. MacDonald.

Instruction and Demonstration.

Dairying.—Half the salary of Dairy Superintendent MacKay and all his expenses, the salary of an assistant for four months, the salary of a stenographer for the greater part of the year together with the cost of the services of several men who have addressed meetings, in connection with advancing the dairy campaign of the province, have been paid out of this grant. The Provincial Government has also done a large amount of work along this line including the operation of two Government Creameries. The united expenditure has given bigger results to the Province of Nova Scotia than any other single expenditure.

Poultry.—The expenses of meetings and demonstrations held throughout the province in the interests of poultry raising have been paid out of this grant. The majority of these meetings and demonstrations were conducted by J. P. Landry, the Poultry Superintendent for the Province. In addition some expenses involved in inaugurating an egg circle in Cumberland County which has been extremely successful, were paid for, and it is anticipated that this successful demonstration in Cumberland county will prove the precursor of other ventures elsewhere in Nova Scotia.

Bee Keeping.—The services of a Provincial Apiculturist C. B. Gooderham have been secured, and during the year he has been carrying on an inspection of the Apiaries of the province with a view to suppressing Foul-Brood and other diseases and also with a view to developing the Apicultural industry in the province. In the meantime his services are not required for the whole year so that only part of his salary is paid out of the Apicultural grant. The balance is paid out of the grant of the Entomological Department, for which Department he works during the time his services are not required for Apicultural inspection, etc. The first annual report of this Apicultural work will be found in subsequent pages of this report.

Soils.—Extensive experiments have been inaugurated with especial reference to the value of lime on the farms of Nova Scotia. For this purpose several carloads of ground lime stone have been shipped to various counties of the province and various experiments are being carried on on representative farms. The salary of an assistant Chemist is being paid. His time is devoted in the main to making soil analyses, etc. In two or three years more a complete soil survey of the province will have been made. The wages and expenses of the Field Crop judges have been paid out of this part of the appropriation. It is unnecessary to dilate upon the value of their work. Read the report of the Chemist and the report of the Field crop competitions for fuller information on this point.

Entomological Investigation.—This is one of the most important activities of the Department of Agriculture. None the less, except in the fruit sections, no service is less appreciated. One may point out that the invasion of the San Jose Scale has seemingly been completely stopped, that the Brown Tail Moth, which has cost some States of the United States millions of dollars, has been kept in curb, that discoveries have been made in regard to such insects as the green apple bug, the result of which will probably add thousands of dollars to the profits of the fruit growers in

Nova Scotia, and so on. Still the work is in a large measure preventative, and people do not fully realize the returns from this kind of work. Be that as it may, this part of the appropriation is used to pay the salary and expenses of the assistant Entomologist, and half the salary and expenses of the field men as well as for material used in experimental work. Two small field laboratories, one at the Dominion Experimental Farm, Kentville, and one at Smith's Cove in Digby County have been conducted and the expenses met in a large measure out of this appropriation.

Fruit-Growing.—The services of two graduates of the College have been employed during the past year to conduct demonstrations in pruning and spraying and fertilizing and renovating old orchards and also in developing vegetable growing in connection with fruit growing. These men have done work in most of the counties of Nova Scotia, from which good results are expected.

Short Courses.—Out of the Short Course appropriation grants have been given to pay part of the cost of erecting suitable buildings for holding short courses, as well as other agricultural purposes, at Yarmouth, Bridgewater, Lawrencetown, Musquodoboit, Shubenacadie, and Antigonish. These buildings have already proven of splendid service, especially the one in Lawrencetown which is the most complete, and which has had the heartiest support of the farmers of the community. It is planned to hold short courses in nearly all these centres each year, although, until the war is over and more men are available to act as instructors, this program will have to be somewhat curtailed. During 1916 three such courses were held, the average attendance at each session of which was well over the two hundred mark. In fact seven hundred students are estimated to have attended the short course in Lawrencetown, Annapolis County. This feature of the policy will, it is hoped, be largely developed in future years.

WOMEN'S WORK.

All the money used in connection with the organization of the Women's Institutes of the province has been paid out of this appropriation. In addition a short course was held at Truro, the expenses of the annual convention at Truro were met, and a magnificent demonstration of women's work was given at the Provincial Exhibition. A detailed report of all these activities, together with an account of meetings held throughout the province, will be found elsewhere in the report of Miss Jennie A. Fraser, Superintendent of Women's Institutes for the Province.

INSTRUCTION IN SCHOOLS.

All the work which at the present time is being done to promote agriculture and nature study in the schools is being paid for out of the Federal appropriation. The expenditure includes the salary and expenses of the Director, L. A. DeWolfe; the salary of the Principal of the Rural Science School, C L. Moore; the salaries of the instructors in the Rural Science School conducted at Truro in July and August; the travelling expenses of school teachers attending the school; bonuses paid to teachers who have conducted school or home gardens in connection with their schools; the partial payment of prizes at school Exhibitions; the expenses of sending out settings of eggs, seeds, etc. to various schools; and other incidental expenditures all of which have been made to further vocational education especially in the rural schools. The full report of this work will be found in the report of the Superintendent of Education for the Province of Nova Scotia.

CONTINGENCIES.

Up to the time of writing, this item has been drawn on to a very limited extent, but as in former years it will be used in the main to supplement some of the foregoing lines of expenditure for which insufficient provision has been made.

CONCLUSION.

There is no question that the status of Agriculture in Nova Scotia is annually improving. Farmers are organizing and adopting improved methods to an extent that would hardly have been thought possible ten years ago. It is an opportunity and a privilege to work with and for the farmers of Nova Scotia and it is particularly satisfactory to note the substantial progress which is being made along various lines. In concluding this report, I wish to convey to yourself, as Premier and Minister of Agriculture, and your colleagues my personal appreciation as well as the appreciation of every member of the staff of the Department of Agriculture for the advice and the assistance which has been received whenever we have sought it. Realizing the importance of developing the natural resources of the country to an extent unthought of before the war brought its tremendous obligations, I can only hope that the Department may in a measure at least live up to its opportunities. On behalf of the staff of the Department of Agriculture,

I have the honor to be, Sir,

Your obedient servant,

M. CUMMING,
Secretary for Agriculture.

TWELFTH ANNUAL REPORT OF THE COLLEGE OF AGRICULTURE AND THE COLLEGE FARM.

Sir:—

I have the honor to submit the Twelfth Annual Report of the College of Agriculture and Farm, being for the year 1916. The report is divided as follows:

Part 1—Report of the Principal.
Part 2—Report of the Professor of Botany.
Part 3—Report of the Professor of Zoology and Provincial Entomologist.
Part 4—Report of the Professor of Horticulture.
Part 5—Report of the Professor of Agriculture and Farm Superintendent.
Part 6—Report of the Superintendent of Poultry.
Part 7—Report of the Superintendent of Dairying and Lecturer in Dairying.
Part 8—Report of the Professor of Chemistry.
Part 9—Report of the Superintendent of Women's Institutes.

PART 1—REPORT OF THE PRINCIPAL.

The number of students now enrolled in the regular course is 54. The year before the war broke out the number was 114. Of the 54 students now enrolled, 34 are from Nova Scotia, 15 from New Brunswick, 4 from Prince Edward Island and 1 from England. There are 15 Seniors and 39 Juniors.

Graduates of 1915-16.

In April 1916, 20 students were awarded the Associate Diploma of the College. They were:—

W. N. Byers, West New Annan, N. S.
John Bishop, Petty Harbor, Nfld.
W. J. Gass, North River, P. E. I.
Lyman T. Chapman, Hastings, N. S.
George Cox, Cambridge Station, N. S.
*R. K. Dewar, Prince William, N. B.
Eric E. Dobie, Charlottetown, P. E. I.
Walter DeLong, Acaciaville, N. S.
William A. Flemming, Truro, N. S.
Burns, Hartling, Malagash Point, N. S.
George D. Jones, Kingston, N. B.
Frederick B. Kinsman, Lakeville, N. S.

N.S.A.C. Short Course Truro N.S. Jan. 1917.

Part of the Short Course Class and the Instructors at the Agricultural College, January, 1917.

Wm. K. McCulloch, Truro, N. S.
J. R. McCormack, Hartland, N. B.
A. B. MacDonald, Glassburn, N. S.
Howard Schurman, Central Bedeque, P. E. I.
Byron Robinson, Canning, N. S.
John L. Rand, Kinsman's Corner, N. S.
Karl F. Redding, Truro, N. S.
Irvine Turner, Berwick, N. S.

*Now overseas with the 193rd Battalion.

In addition to this list Mr. Cyrus Porrior of Mt. Carmel, P. E. I. will receive his diploma when he has completed his drainage plans; Mr. A. J. MacDonald, Welsford, N. B. completed all the subjects for his diploma except Chemistry; Mr. Ivey Scott, Little Shemogue, N. B., attended until the Christmas term and is now in the 165th Batt. Norman Parker, Middle Stewiacke, N. S., attended part of the term but has gone overseas with the 106th Batt.

The Premier Murray Cup for the best judging of live stock was won by Thos. Munn, Leitche's Creek, C. B., and the Prince Edward Island Cup for the best judging of seeds was won by H. St. Clair Cutten, Lr. Truro (now overseas). The Governor General's medal for the highest standing was won by Walter DeLong, Acaciaville, N. S.

During the term an effort has been made to secure the names of all students and who have attended the regular course at the College who have joined the overseas forces. At the time of writing 104 names have been ascertained, but the list is incomplete. This represents about 22% of all the students who have attended the regular course at the College since the opening eleven years ago.

The Short Course.

The "War Time Short Course," held during the first two weeks of January, 1917, was the biggest course ever held in the history of the College. The number of names actually enrolled was 290, 41 being women attending the special course for women and the balance being men attending the short course for men. Besides this number, there were from 100 to 200 more who attended more or less intermittently. Ten of these Short Course students came from New Brunswick; the rest were from the Province of Nova Scotia. This large Short Course attendance was further supplemented by delegates to the Maritime Stock Breeders' Association, the Dairymen's Association of Nova Scotia, the Nova Scotia Poultry Association and the Canadian Guernsey Breeders' Association. Had the names of those attending these associations been included, the total would have amounted to fully 500, which must be regarded as an attendance that would bear comparison in proportion to the population with the attendance of any other institution in America.

Extra Mural Short Courses.

In addition to the Short Course held at the College, three other Short Courses, each of three to four days duration were held at the following places; Yarmouth, Lawrencetown and Antigonish. The average attendance at all sessions, morning, afternoon and evening at these courses was considerably over 200, and the aggregate attendance of those taking one or more classes at the three courses was considerable over 1200.

These Short Courses were conducted by the members of the College staff. They will continue to be a prominent feature in the future development of agricultural education in the Province.

The Rural Science School.

There were 192 teachers in attendance at the Rural Science School held during July and August, 1915. This school is conducted jointly by the staffs of the Agricultural and Normal College. A detailed report will be found in the report of the Superintendent of Education for the Province.

The Faculty.

The College has suffered a severe loss in the death of Professor B. H. Landels who fell in a charge on the German trenches in Sept. last. Mr. Landels had been on the College staff for five years in the capacity of Superintendent of the Drainage Department and Field Experiments. He was a painstaking and efficient instructor who held the confidence and respect of the student body and of the farmers who came in touch with him. His record while at the front was of a very high order, he having been mentioned in despatches and having been promoted on the field from the ranks to the Commission of Lieutenant. It will be hard to fill his place. None the less Professor Landels has performed the highest duty that was in his power for his King and Country.

Other members of the College staff who are now overseas are Captain C. A. Good, Assistant Entomologist, Lieutenant

A. E. Humphrey, Assistant in the Drainage Department, Sergt. W. J. Bird, Assistant Dairy Superintendent, Gunner P. L. Sandford, formerly Assistant to the Farm Superintendent.

During the year Mr. J. G. Archibald a graduate of this College and of the Ontario Agricultural College, Guelph, has been appointed Assistant Chemist. Mr. C. B. Gooderham has been appointed Provincial Apiarist and Assistant in the Entomological Department. The vacancies created by three members of the staff who have gone overseas have not been filled.

Reports of the Staff.

I would strongly recommend the reader to peruse the subsequent reports of the members of the College staff and of the Department of Agriculture in which will be found an account of the work which is being attempted by the Department. It is sufficient for me to premise that in every branch progress has been made and a strong foundation laid for still more progressive and valuable work.

CONCLUSION.

To what extent the regular work of the College will be developed, should the war continue, I am not prepared to say. Already the staff has been depleted and the student body largely decreased, which is as it should be. My own judgment is that the main work of the College and of the Department should be the carrying on of Short Courses, demonstrations, and other work suited to the needs of the busy farmer who, at best in these strenuous days, cannot afford much time away from his work. Gradually too there will be a demand for a special course suited to the needs of returned soldiers who desire to settle on the land, for which provision will certainly be made.

I would not consider it proper at the present time to even suggest needed improvements. For these it seems but right that we should wait until the war is over. And in any case, the Institution is now so well fitted for instruction and investigation purposes that, unless a large development were planned, the equipment is ample.

This report would be incomplete did I not refer to the assistance and advice and encouragement which the members of the staff and myself have from time to time received from yourself as Premier and Minister of Agriculture and from your colleagues. That we may prove worthy of the trust you have reposed in us, and that the results of our work may lead to the further advancement of agriculture in Nova Scotia, it is the hope of

Your obedient servant,

M. CUMMING,
Principal College of Agriculture.

PART 2--REPORT OF THE PROFESSOR OF BOTANY.

Principal M. Cumming, Esq.,

Sir:—I have the honor to submit my annual report. With our increased facilities I have been able to carry out the instruction in this department more effectively than ever before. The Junior class was given a course in general and systematic botany with a brief review of some common plant diseases and their treatment and a short course on weeds and their control. The Senior class was given a review of systematic botany, a study of higher plants of economic importance, the anatomy and physiology of plants and a thorough course in their minute structure and their diseases. This work together with whatever assistance I was able to render in the general oversight of the students and college management occupied my time from early in October till the middle of April. During the summer I conducted the class in plant diseases in the Rural Science School. Although a 'Minor' subject in the course the number of students taking it has steadily increased and its value and importance to the teacher has become more fully appreciated so that I trust, with the greater latitude which our new regulations allow it will become of great benefit to teacher, schools and communities. Already many teachers taking the course appeal to me for help and in this way their school and also the farmer is benefitted.

During the summer when time permitted I made a careful duplicate copy of our register of students since the opening of the College. I also had printed a pamphlet on "Some Plant Diseases of Ecomomic Importance" which will prove useful. I have also prepared a report upon the diseases of fruits which will appear in the special horticultural part of your report. I am also including in this report some information upon diseases affecting root crops and potatoes.

POTATO DISEASES.

Phytophthora infestans, Late Blight and Rot of the Potato. There are two distinct blights of the potato common here, the Early and the Late Blight. They are both present every year in nearly every field of potatoes. If the conditions are favorable the early part of the summer the Early Blight ruins the crop and if in late summer or autumn then the Late Blight does the damage.

The Early Blight does not belong to the same class of diseases as the Late Blight but from its constant association it will be treated here. Its scientific name is Macrosporium solani. It is present every year in the potato field and if the conditions are favorable in July the leaves will rapidly wilt and the stalks gradually die down. The half to a third grown tubers are sound and show no indications of rot. This is early blight. It is nearly always present during the Autumn but as the nights are cooler it rarely does so much damage as earlier in the season but is always associated with late blight. The spots on the leaves caused by early blight are lighter colored, dry up more readily, and are not likely to become water soaked. In late blight they are darker and readily retain the dew and become very moist.

Late blight is one of the most serious plant diseases in this province and annually causes a great loss. It does not usually attack the crop till August when the longer nights and heavy dews furnish suitable conditions. At first single hills through the field show the disease, particularly on the lower leaves if the infection is local but if from adjoining fields it may appear in one part or all over the field at the same time. Much also depends on the weather, prevailing winds and temperature. It may develop slowly or very rapidly. The leaves are first killed and the lower ones become soggy.

The fungus also attacks the stems. The spores which are very abundant and motile, if they fall upon tubers or are carried into the soil till they come into contact with a tuber grow and penetrate the potato. If this remains in the soil for some time and it is moist the walls break down and a soft white material is produced just under the skin. This eventually involves the entire potato. If however the soil is dry, after the spore has reached the tuber or the latter is dug and kept dry there results a slow dry decay. Often other fungi (including bacteria) gain entrance to this material and may alter its appearance and produce disagreeable odors and characters. The fungus may only become established upon the tuber and cause no serious blemish, then when planted the following season grow and reproduce the disease. This is a common way.

Life History: (1) The disease has developed either from the tuber planted or from diseased tubers left ungathered the previous year and first appears in late July or August usually on the older leaves of certain plants throughout the field or it is carried to the field by insects or wind, or other means from affected fields.

(2) The disease does not appear on the plant for some days under most favorable conditions till the spore has had time to develop in the leaf. This is the first period of growth of the fungus and continues till a spot or portion of the leaf is killed and this dead part is surrounded with a light colored dying ring. The dead area readily absorbs water.

(3) These spots grow till they involve the entire leaf and are continuously producing spores. Nothing can be applied to kill the fungus or stop its growth after it is established.

(4) The spores thus produced fall on or are carried to new leaves and form new spots unless prevented by spraying.

(5) Spores falling on the ground with the aid of water reach tubers and there grow to cause:

(a) immediate soft rot,

(b) soft rot when the tuber is stored in a warm, damp place,

(c) Dry rot,

(d) a slight discoloring till planted.

(6) Any of the affected tubers in (5) if planted will continue the disease and produce a diseased plant the following year. There are possibly other means of carrying the disease over winter besides the diseased tubers, but this is the only known way.

TREATMENT:—Select only healthy tubers, for planting. Preferably, if the crop has been affected, make the selection at the time of digging from that portion or those hills that have not been attacked. If the crop was not sprayed and is all injured then dig the potatoes as soon as possible after they are blighted, and store in a dry cool place. As the loss in a single season is greater than the cost of spraying for a number of years it pays to spray every season not only because it insures the crop for that year but healthy tubers for planting the next year. In this province the potato tops for most varieties should remain green till killed by frost and if they do not there is a loss in yield proportionate to the time elapsed from dying till frost. Spray the plants thoroughly with Bordeaux mixture in July before early blight appears in the locality. By reference to the date when the early blight has appeared in previous years one can tell when to begin. There is also an advantage in this early spray for the late blight, as the lower leaves are much easier and more thoroughly sprayed than they can be later in the season. If the potato plant or top made no further growth this spray would be almost sufficient for the season but not only does each leaf continue to grow but new leaves are put forth so that in about ten days there are enough to hide the sprayed part. Ordinarily the spray has not washed off but is simply sheltered by the new foliage and then is not likely to wash off. Indeed if it is retained for a week it will be useful for the rest of the season and future sprays should be directed to the new foliage. Enough will fall on the foliage previously sprayed without an effort for this purpose. The applications of spray for the new foliage should be made every ten days or two weeks. The wetter the season the more frequently. If from any cause hills or plants are blighted in any part of the field it will be advantageous to dig such plants early and keep the product separate.

Spongospora Scabies, Powdery Scab or Corky Scab of Potato. This disease resembles the common American scab so that it is often difficult to distinguish them apart and in the presence of the American scab it can only be recognized by the aid of the microscope. It is adapted to wet climates and wet soils and thus far in America, it has not been serious except in such situations. It is locally, in certain seasons, injurious in this province.

TREATMENT:—Use only clean tubers for planting and plant on land free from scab of any kind. Exercise the greatest care that soil from affected fields is not carried on to or washes in any way to other fields. Affected soils should not be planted to potatoes for some years. Drainage and the application of lime are often beneficial. Where either this or American scab already is present on the farm, the tubers for planting should be soaked in corrosive sublimate or formalin solution for one half hour and rinsed before cutting and planting, before the tubers have sprouted.

Oospora scabies, American Potato Scab*. This well known disease needs no description as there are few who do not know "scabby potatoes." It also attacks Turnips, Beets and Mangels and produces its characteristic spots on them. While it disfigures these vegetables it does not render them in any way unfit for food.

TREATMENT:—After the soil is once infected with this disease no way of freeing it is known. It is therefore important that care is exercised to keep it out of the soil. Use only potatoes free from the scab for planting. If the potatoes have been in contact with scabby potatoes or bins or bags which have held such potatoes, then treat them with corrosive sublimate or formalin solution, for one or two hours before cutting and planting. Do not plant either potatoes, beets, mangels or turnips on affected soil.

(*Now placed by *Gussow* among sheathed bacteria.)

Black Leg. This disease is reported to be on the increase in the province and doing considerable damage. It is recognized in the early part of the season by examining those plants which appear unhealthy and have a lighter yellow foliage. If they prove to have the stalk blackened or with streaks under ground and these associated with the decayed tubers which were planted and the rootstalks adjacent leading to the forming tubers also affected—if any of these conditions are present then the disease is probably Black Leg.

TREATMENT:—Remove all affected plants together with any affected tubers already formed. Exercise care that the material is not scattered on to other plants. Use Bordeaux mixture as a spray.

Rhizoctonia on Potatoes. This disease is occasionally established in fields in certain localities. A severe attack can be detected as a mould occuring on the growing potato stalks and later when the tubers are dug, as small black bodies adhering to the tubers. It reduces the yield in proportion to the severity of the attack. Where well established in the soil it noticeably affects the growth of the crop.

TREATMENT:—Do not plant affected soil to potato root or garden crops but use for grain or grass. Care should be exercised to prevent the transportation of such soil to other fields. Potatoes affected or from affected soil should not be used for planting.

Fusarium, Dry Rot. This form of dry rot is wide spread but does little damage unless the potatoes are improperly stored. It frequently accompanies other injuries and is the most common white mould on stored potatoes.

The numerous other diseases to which potatoes are subject are not as yet if present, of apparent economic importance. Their origin and characters are unknown or little understood but they might develop into serious diseases any year. Of these Leaf Curl, Wilt and Mosaic diseases should be looked for. Plants with mottled leaves or wilting without apparent cause or with unusually curled leaves should be noted and, if at all common, specimens should be sent here for examination and the tubers not used for planting.

In general select only sound tubers from healthy plants on the healthy part of the field for planting. Do not mix diseased and healthy tubers and store the potatoes in as cool and dry a cellar as possible without danger of freezing. In autumn the condition of the cellar can often be improved by opening the windows at night and closing them during the day.

Suggestions in Relation to Potato Growing.

Tubers for planting. Select only sound healthy tubers. Small potatoes are often healthier than large tubers and such can be used often to advantage providing that such tubers are not cut, as the size of the piece planted should always be large enough to send up strong sprouts.

If the tubers are from a healthy crop and soil free from disease they require no preparatory treatment before planting but where it is necessary to use tubers from a poor crop (an indication of disease) or from soil known to be diseased then the best that can be done is to treat the seed with an antiseptic before planting. The most efficient treatment is with corrosive sublimate solution although formaldehyde solution is good for many diseases. The treatment should be given long before time to plant so that injury produced to the eyes and sprouts may have passed and the sprouting not be delayed. Some injury is always liable to occur but is not permanent if the treatment is previous to midwinter. If performed just before planting, sprouting and the growth of the crop may be seriously delayed. In using the corrosive sublimate solution it is necessary to make sufficient solution so that only two lots of potatoes shall be dipped into it as the solution is weakened with each use. While possible to strengthen it with more of the poison, it is safer and more expedient to make a fresh solution. As this is a poison care must be taken that these treated potatoes are used only for planting. As soon as the plants are about six inches high it is a good practice to inspect them plant by plant. Nothing is accomplished by standing back and just looking over the field casually as it is a pretty poor crop that does not "Look well." Sickly plants should be removed and preferably burned. Plants with rotten stems under ground or with black streaks leading to the planted piece and with perceptibly sickly foliage and easily pulled should be carefully gathered into a pail so as not to scatter the soil or plant on to healthy plants. Where an occasional hill shows signs of late blight by having dead, wet or sodden lower leaves it should also be removed. Sickly plants produce no adequate return and adjacent plants will grow enough better to compensate for their removal.

There is no known treatment for diseased soils as those having scab, etc., and such soils should not be used for potatoes.

When the crop is dug the potatoes for planting should be selected from that part of the field which produces the best crop and the healthiest rather than selecting good hills without regard to the character of the soil, as sometimes exceptionally good hills occur in diseased soil and such would likely be contaminated with scab, Rhizoctonia, etc. even if the disease is not evident.

Spraying should always begin early so that the foliage is protected before the fungi are ready to grow and while the plants are small enough so that the lower leaves can be well covered. Such leaves have about obtained their full size and if well sprayed will retain sufficient spray with what falls on them without further attention on the part of the operator. It is practically impossible to properly spray them after the plants are large. The spray must be repeated frequently enough to protect the newly developing foliage and it is important to continue the applications till the tops die. If the spraying is discontinued too early the late blight may attack the unsprayed leaves and the tubers rot. One reason why there is no rot following early blight is that the tops are dead so that late blight is prevented and hence no rot from it.

Bordeaux Mixture; This is prepared by dissolving one pound of quick lime in a little water and adding gradually more water to this and straining through cloth till the solution amounts to about nine gallons. In another vessel dissolve one pound of blue vitriol (Copper sulphate) in nearly a gallon of water. This is more easily done if the water is hot and the salt is suspended in a cloth near the surface of the water. Cool this solution and add it to the lime solution with constant stirring. Use only wooden utensils. This mixture should be used soon after mixing the two solutions and should be kept well stirred. There are many published methods of making this mixture. One is about as good as another providing that one or both solutions are as dilute as possible.

Bordeaux mixture was the earliest used and in general has proven the best spray. It was the spray that demonstrated the value of spraying to control plant diseases. It is the only fungicide to use on potatoes. Poisons can be added to kill insects.

Corrosive sublimate. This solution is prepared by dissolving one ounce of mercuric chloride (Corrosive sublimate) in six or seven gallons of water. Use wooden utensils.

Formaldehyde (*Formalin*). This solution is prepared by adding one pound of formaldehyde of about forty percent strength to thirty gallons of water or one part to three hundred parts of water.

These solutions are too strong to use on potatoes which have sprouts on or the eyes swollen and where treatment has been deferred too long it will be necessary to use them more dilute. Formaldehyde may be used one half the above strength, but should be left on longer.

TURNIP DISEASES.

Plasmodiophora brassicae, Club-root of Cabbage, Turnip, etc. This disease is not easily mistaken. When it is present some of the affected plants will have swellings on the small roots and some of the larger roots will be misshapen. Later in the season many of the affected plants decay but this is frequently if not always due to the entrance of another fungus. Sometimes the affected plants grow vigorously but as a rule, they are stunted and worthless. This disease usually does little damage the first year it is in the soil, but the second suitable crop is badly injured and then it first attracts the farmer's attention. I have traced infestations to a number of sources: (1) Purchase of affected plant for feeding, (2) Transportation of soil on farm machinery, by wash of freshets from affected fields to other fields and by the blowing of the soil in winter by winds from exposed fields on hills to other fields, (3) by seeds from affected soil. The latter has been an increasing method of its distribution for in some way the disease often goes with the seed. It is possible that seedsmen grow their seeds on contaminated soil and in gathering the crop spores of this disease are gathered with the seed. In any case the seed sown on apparently clean soil has produced affected plants.

There are other swellings on the roots of cabbage, turnips, beets, etc., which are due to other and quite different causes but these are not as a rule serious although in two instances brought to my attention they were abundant enough to attract attention. These swellings were always rounder and like an excrescence upon the root and not so much a swelling of the root itself.

TREATMENT:—Do not use affected soil for a number of years for cruciferous crops. Destroy all such weeds. Heavy applications of lime to affected soils or to the field to be planted have been recommended and often found beneficial. It should be applied the year previous to planting or where soil is found affected for a number of seasons following. Seeds for planting should be soaked in Corrosive sublimate or Formalin solution with gentle agitation for fifteen minutes then drained through a cloth and after another fifteen minutes thoroughly washed and dried in a current of air or spread out in a thin layer till dry enough to plant. It is best to substitute some other root crop for turnips, such as beets, sugar beets or mangolds as these crops are not attacked by this disease.

As to the wisdom of using lime in small or large quantities, that is a question which each farmer must decide for himself, but some of the principles that should guide him, are here given.

(1) If his soil is very sour then moderate applications would be useful in any case. If he desires to grow roots and cabbage or other cruciferae on a large scale and frequently on the same soil it would be necessary to make heavy applications of lime. If on the other hand potatoes were his chief crop or likely to follow roots or cabbage then another serious factor is introduced. (2) While lime does not directly cause American scab on potatoes it is very favorable to its growth and considering that it is hard to find either tubers for planting or soil in which potatoes have grown entirely free from scab it would be usually unwise to apply lime immediately before potatoes or heavy applications to soils likely to be used for potatoes. Excluding this disease, moderate applications of lime to the soil are usually beneficial quite independent of soil acidity. It furnishes in some cases plant food and it indirectly increases the fertility of the soil and liberates or makes available other fertilizers. There is however danger of overdoing this and the history of the province illustrates this in the spasmodic agitations that have arisen from time to time for the use of lime. Probably the wisest practice would be to use either slag or super phosphate in connection with manure and other humus as when so used during the decay of the manure the phosphate is dissolved and lime set free. As all our farms need phosphates the lime is obtained free and the phosphate at a minimum cost.

Attention is especially called to the articles on lime in last year's report of the Secretary for Agriculture and in this year's Report of the Division of Horticulture and that of Mr. Cunningham, District Representative for C. B.

Pseudomonas campestris, Black Rot of Crucifers. This disease now occurs throughout the province and causes very large losses. On cabbage it is easily recognized as the plants rapidly decay and many, nearly all, take on a black watery rot. Turnips are also seriously affected but the leaves do not necessarily blacken but if those affected are cut across, the darkened veins show while the root has a characteristic rot starting from the leaves and extending into the center or involving the entire root.

TREATMENT:—Where an outbreak of this disease occurs it is safest not to grow either of these crops the following year or at best only on a distant field and exercise care that none of the refuse of the diseased crop reaches that field on tools or manure. Treat the seed before sowing as directed under club root as it is thought that the bacteria are distributed with the seed.

Oospora scabies, American Potato Scab. This also attacks turnips. For discussion see potato diseases.

BEET AND MANGOLD DISEASES.

Decay or Rot. This is commonly caused by Rhizoctonia. For a discussion see Potato Diseases. As there pointed out affected soil should not be planted to root crops.

Oospora scabies, American Potato Scab. This also is discussed under Potato Diseases. It is quite injurious to all kinds of beets and attacks mangolds but not evident on carrots or parsnips.

Cercospora Beticola, Leaf Spot. This occurs commonly and produces somewhat circular spots on the leaves and the gradual death of the affected leaves. This may seriously reduce the yield. The spots when well grown are light colored in the center with a colored border.

TREATMENT:—Where the disease has occured the previous year either omit these crops or spray with Bordeaux mixture to which some skim milk or buttermilk has been added to make it adhere. Spray a little while previous to the date of the appearance of the disease the previous year.

CARROT AND PARSNIP DISEASES.

A rot due to Rhizoctonia occurs so that affected soil should not be planted to these roots. See Potato Diseases.

A Soft Rot, especially present in early spring on roots left in the ground and apparently due to bacteria occasionally occurs in this province.

TREATMENT:—Plant on clean ground and treat the seed before planting as directed under club root.

A leaf spot occurs upon parsnips similar to that on celery and when present, care should be exercised that these crops do not follow one another on such fields. Use Bordeaux Mixture as a spray.

SUGGESTIONS IN RELATION TO ROOT GROWING.

The climate of the Maritime Provinces differs in many respects from that in any other part of this continent. The usually abundant rain fall, the cool summer and the long cool autumns are pre-eminently the conditions for root crops. The large acreage and yield show that this is appreciated. There is always a danger when any crop is increasingly cultivated that the diseases affecting it will increase in virulence and that new diseases will be introduced. It is on this account that every root grower should observe the following precautions: When possible raise your own seed. Raise the seed on land that has not previously had a root crop or at least not for years. This will provide healthy seed if care to select only sound roots for the seed production is observed. If it is necessary to purchase seed buy the seed even from known dealers with a guarantee that there is no disease present or if necessary to use the commercial seed, treat the seed as directed for club root. It is best in such cases to obtain samples of the seed offered and after treating the sample or two hundred seeds test their germination or send to Ottawa or here to have tested. Then the purchase can be made intelligently. This requires foresight as at least two weeks would be required to have the germination tested.

Land producing scabby potatoes should be used only for Carrot and Parsnip root crops if there is to be an attempt to get rid of this trouble. It does not seriously affect the yield of Swedes but to grow them on such soil perpetuates the trouble. Nor should lime in large amounts be applied to such soil unless it is proposed to abandon the growth of potatoes there indefinitely. Where club root occurs as well as scab the choice of which crop to grow must be made and the use of lime made accordingly. Probably if the scab is bad it would be wiser to use lime and get rid of the club root and not plan to grow potatoes in that field again.

Where club root is present but no scab then apply lime and when next the field is to be planted to potatoes be sure that there is no scab on the seed used or treat the seed before planting as directed.

The most serious of recent diseases of turnip is the rot. While rot occurs from a number of causes the Black Rot of Crucifers is the usual cause and where rotten roots occur this should be established by sending affected plants here for examination. This is a hard disease to control but with care it is possible without abandoning the crop for two years although this is the easiest way. Treat the seed as directed and plant on land which has not recently had crucifers on it or on adjoining fields. Exercise care that the manure is not from stock fed turnips.

The practice of every farmer should be to send a specimen of a plant (The entire plant when possible) here for examination when he finds disease present. A microscopic examination is often the only way to determine the disease.

Respectfully submitted,

H. W. SMITH.

PART 3—REPORT OF THE PROFESSOR OF ZOOLOGY AND PROVINCIAL ENTOMOLOGIST.

M. Cumming, B. A., B. S. A., Secretary for Agriculture.

Sir:—I hereby submit my fourth Annual Report as Provincial Entomologist and fifth Report of the Department of Zoology and Entomology of the Nova Scotia Agricultural College.

The past year's work will be discussed under the following headings:—

1. General.
2. Brown-tail Moth Report.
3. Inspection of Nursery Stock Report.
4. Experimental Report.
5. Apiary Inspection Report.
6. Conclusion.

General.

During the winter months considerable time had to be devoted to teaching the regular classes in Zoology and Entomology and to matters connected with these courses. In the spring months a short introductory course in Entomology was given to the Rural Science Students.

The college collection has now been mounted and properly arranged for the first time. Owing to the many demands upon the time of each member of the staff, no systematic collecting has been done. The insects in our collection have been practically all taken at odd moments by members of the department. On this account, many common forms have never been secured, though a list of our collection will show a number of new records for Nova Scotia and a few that are new to North America. Such a list is being prepared for publication and it is hoped that correspondents will fill in the gaps. We continue, as time permits, to prepare demonstration sets of various injurious insects for educational purposes. Considerable has been done in the way of insect photography and many suitable illustrations have been made. From these we have been able to prepare a fairly complete lantern slide collection, which is proving of considerable benefit to us in our work.

A large correspondence has been attended to during the year and many specimens submitted for determination have been identified and the necessary information given.

A systematic endeavor has been made to keep the general public in touch with our work in every possible way. With this end in view, contributions have been made to the agricultural press and numerous meetings have been held in orchards where we have been conducting experimental work, in order that the public might see the results of the work which is being performed on their behalf.

Various meetings of fruit growers have been attended from time to time and addresses given. In company with Mr. M. B. Davis of the Dominion Experimental Farm, a number of illustrated lectures were delivered throughout Kings Co., in the month of January and February, which were well attended. Papers were given before the Nova Scotia Fruit Growers Association, the Ontario Entomological Society and the Nova Scotia Entomological Society. Whenever possible, various gatherings of fruit growers have been attended when it seemed likely that our work should benefit thereby.

The past year has seen the completion of a number of problems that have been engaging our attention during the past two seasons, while various others are now well under way. Two bulletins have been prepared and are now ready for the press, viz:

1. The Green Apple Bug in Nova Scotia. Bul. No. 8.
2. The Apple Maggot in Nova Scotia. Bul. No. 9.

The first of these has been prepared by myself with the assistance of various members of the staff. The second is based on the careful inspection of the infested area carried on during the past three years and upon the experimental work performed by Mr. C. A. Good, during the seasons of 1914 and 1915, which has been continued and extended in scope during the past season.

In addition to the foregoing, the first report of the N. S. Entomological Society was edited and its publication arranged for. For this number, articles were prepared dealing with various forms that have been the object of investigation by members of the department. Similar articles have been prepared for the next number, as well as a few more or less technical papers for other publications. In addition to this, an account of various injurious insects has been prepared for the second part of this report. A joint circular entitled "Results from Spraying in Nova Scotia" containing a spray calendar for Nova Scotia orchards, was prepared in collaboration with Mr. George E. Sanders and published as Circular No. 7 of the Dominion Entomological Branch.

It again gives me great pleasure to acknowledge the valuable assistance rendered the department by those associated with me in carrying on the entomological work. The loss of Mr. C. A. Good, Assistant Entomologist, whose place has not been filled, has been a decided one. His departure to join the overseas forces, has placed an added burden upon those that remain. Nevertheless, we have been able to carry on all the work that was projected and even to begin new problems, though with a staff considerably reduced. Mr. C. B. Gooderham, in addition to his work in the inspection of apiaries, has found time to help at various times with strictly entomological problems. We have also availed ourselves of his services in the taking of photographs to illustrate our various publications.

Mr. L. G. Saunders has had charge of the laboratory at Smith's Cove during the past summer. His work has principally been of a technical and artistic character and along these lines he has done valuable service. Mr. C. F. U. Whitman and Mr. J. P. Spittall have had charge of the spraying and other field experiments. The success of this work is due in no small degree to their earnest, painstaking efforts. Mr. H. G. Payne conducted the inspection station at Truro in an efficient manner. During the summer months he carried on rearing work at the Kentville Laboratory and during the winter, when not otherwise engaged, he had charge of arranging the permanent collection. Mr. W. E. Whitehead assisted Mr. Payne with the spring inspection work and during the summer months remained at Truro, where he carried on the routine work of the department in my absence, carried on experimental work under my direction, assisted in photographic work and accomplished much valuable and necessary work. The very efficient assistance of all the foregoing, as well as those who have been associated with the department for shorter periods is deserving of the highest commendation. I also wish to thank Miss Sproule for her faithful attention to the work of the department.

The close co-operation which, from the outset, has existed between our department and the Dominion Entomological Branch has been maintained, to the advantage of both. The results of this co-operation are already bearing fruit.

Brown-tail Moth Report.

The following is the Brown-tail moth Report for the season of 1914-15. Like previous reports on this subject, it has been compiled from the reports of the inspectors and from a summary report submitted to me by Mr. G. E. Sanders, Dominion Field Officer. As in previous seasons the Dominion Entomologist has assumed responsibility for the work, which has been carried on under the direct supervision of the Field Officer, Mr. Sanders, one half the staff being supplied by the province and one half by the Dominion.

The work was carried on between the dates Nov. 1, 1915 and April 29, 1916, inclusive, and average total of 10 men taking part. The following men worked for a whole or part of the season on the provincial staff: Messrs. C. F. Whitman, W. E. Whitehead, J. P. Spittall, P. E. Donat, R. M. Sanford and C. M. Dickey. The following men were employed by the Dominion: Messrs. A. G. Dustan, F. G. Gilliat, W. L. Harris, S. H. Payne and V. Chute.

During November and December, F. C. Gilliat and C. M. Dickey inspected the Bear River district; during January they covered Yarmouth and Shelburne Counties and in February and March they worked the ground from Middleton to Kentville. In this territory they were assisted by C. F. U. Whitman with the two inspectors under his charge. During April Mr. Whitman assisted by F. M. Chipman reinspected Bear River and vicinity.

Annapolis, Mochelle and Granville were inspected during the months of November and December. This territory was at first worked by A. G. Dustan and W. E. Whitehead. Mr. Whitehead was later transferred to another party and his place taken by J. P. Spittall, while Mr. Dustan was replaced by Mr. W. L. Harris. This party then worked the territory from Round Hill to Smith's Cove during January, February and the first half of March and returned to it again from April 15th to April 30th. From March 15th to April 15th they worked from Wolfville to Windsor and scouted east of that place. S. H. Payne and J. P. Spittall started on Nov. 1st to work the territory between Round Hill and Paradise. On Nov. 15th Mr. Spittall was replaced by P. E. Donat. On Jan. 8th, their territory having been gone over once, this party left to do inspection work in Digby Co. On Jan. 24, R. M. Sanford was appointed a provincial inspector and was placed with Mr. Payne, Mr. Donat being transferred. On March 11th, Digby Co. being finished, this party returned and reinspected their original territory about Bear River.

After working between Paradise and Middleton during November, C. F. U. Whitman and W. L. Harris spent one week assisting F. C. Gilliat in Bear River and then returned to their original territory until Jan. 1st. On Jan. 1, W. L. Harris was transferred to another party and F. M. Chipman was appointed in his place. This party continued east from Middleton and arrived in Kentville on March 30 having had the assistance of Mr. P. E. Donat from Jan. 24th to March 30th. As previously noted, F. C. Gilliat and C. M. Dickey worked this territory for two months. On March 30th, C. F. U. Whitman left to look after the fumigation station at Digby and P. E. Donat enlisted with the overseas forces. F. M. Chipman was transferred to F. C. Gilliat's party for the month of April.

V. A. Chute worked east from Middleton alone during the first two weeks of November. He then was joined by W. E. Whitehead and the two worked from Middleton to Berwick during November and December visiting places that had been infested the previous year. They then moved to Bridgetown and worked from there through to Granville and up the Bay of Fundy Shore to Victoria Harbour. After finishing this territory they worked the territory east of Bridgetown until April 30th.

The general plan followed was to cover the heavily infested territory three times, twice by one party, who visited at least the most dangerous parts and once by another party; the moderately infested territory to be covered twice and the lightly infested once.

Two previously undiscovered outbreaks in wild land were uncovered during the winter. One was situated in a thorn and apple scrub on the mountain side south of Torbrook, the other on an island in the Sissibou River just above Weymonth. The Torbrook infestation gave about 2000 nests and the Weymouth one about 300. In both infestations many of the nests were on low lying thorn and rose. This made thorough work very difficult and, in order that both these outbreaks should be thoroughly stamped out, a party of inspectors went over the ground in April, searching for nests and burning out the worst spots with a kerosene burning apparatus.

Nests of the Brown-tail Moth were found in 136 localities in 1915-16 as against 155 the previous year and a total of 14,755 nests were collected, as against 18,154 the previous year, thus giving us two years of decrease since the season of 1913.

Details of the number of nests taken in each locality since the beginning of the inspection are on file in my office and are available to all interested. The following table gives the totals of nests taken by counties, former years being given for comparison;—

Brown-tail Moth Count by Counties.

	1909-10	1910-11	1911-12	1912-13	1913-14	1914-15	1915-16
Yarmouth....	....	12	10	3	1007	73	37
Digby........	414	3004	3688	5064	7699	5460	531
Annapolis....	1070	1444	4333	5882	14572	12154	13449
Kings........	....	2	39	105	845	554	823
Hants........	....	....	....	1	1	12	5
Cumberland..	....	....	....	.....	2	.....	.....
Shelburne....	....	....	....	.....	30	1	.....
Locality Unknown..	12	....	....	.....	.....	.....	.....
	1496	4462	8070	11054	24156	18154	14845

The following shows the various host plants upon which nests were taken;—

Number of Nests Found on Different Species of Plants.

	1914–15	1915–16
Apple	15524	10966
Thorn	823	1812
Pear	839	759
Wild Rose	5	389
Wild Pear	319	320
Plum	285	215
Oak	223	162
Wild Cherry	10	37
Maple	14	21
Birch	3	21
Sweet Cherry	41	18
Quince	20	9
Elm	26	5
Beech		5
Spiraea	1	5
Bayberry	1	3
Alder		3
Willow	1	2
Mountain Ash	1	2
Poplar	2	1
Currant		1
Raspberry		1
Hazel		1
Black Cherry	2	
Acacia	1	
Maple	1	
	18154	14845

The following table gives the list of localities infested last year, but clean this year:—

Localities Infested 1914-15 and Found Clean 1915-16.

	Nests.
East Margaretville	26
Mavilette	15
Hillsburn	12
Ireton	10
Cape St. Mary	10
Summerville Hants	10
Digby	8
Delusion	7
Culloden	7
Concession	7
Cedar Lake	7
Mistake Sett	6
New Edinburgh	5
St. Croix	5
Clairmont	5
Doucet Lake	5
Youngs Cove	4
Phinney Cove	4
Morden	4
Yarmouth	4
Morgantown	3
Cheggogin	3
Gates Mt	3
Victoria Harbour	3
Barton	3
Gilberts Cove	3
Hebron	3
Sanford	2
Chebogue Centre	2
Belliveaus Cove	2
Harborville	2
Acaciaville	2
Port Maitland	2
Brighton	2
Pleasant Valley	2
Marshalltown	2
Sandy Cove	2
Little River	2
Guinea	1
Pembroke Shore	1
Arcadia	1
Doucetteville	1
Bishop Mountain	1

Localities Infested 1914-15 and Found Clean 1915-16.

(Continued.)

	Nests.
Auburn Mt. Road	1
Burlington	1
Garland	1
Prospect	1
Bloomington	1
Lake Annis	1
Pleasant Lake	1
Greenfield	1
Salmon River	1
Shelburne	1
Hectanooga	1
Little Brook	1
Cambridge Hants	1
Tennycape	1

57 localities in all.

The following tables give the data regarding the spread of the moth since last season:—

New Infestations Uncovered in 1915-16.

	Nests.
Lower Canard	115
Victoria Beach	33
Gaspereaux	30
Lakeville	17
Canard	11
Factorydale	9
Nicholsville	8
South Tremont	8
Highbury	7
Wolfville	7
North Waterville	7
North Alton	6
Hantsport	5
Inglisville	4
Perotte	4
Waterville	4
Coldbrook	3
Grand Pre	3
Princedale	3
Virginia	3
Avonport	2
Brazil Lake	2
Centreville Kings	2
Hillview	2
So. Greenwood	2
So. Harmony	2
Steam Mill Vill	2
Woodstock	2
Atlanta	1
Chipman Cor.	1
Church Point	1
Greywood	1
Horton Landing	1
Jordantown	1
New Minas	1
New Tusket	1
Reynards Brook	1
Starrs Point	1

Total............ 38

The following table gives interesting figures relative to the increase in the infestation from nests missed the year before:—

Locality	No. of old nests	No. of new nests within 50 feet	Total nests in locality
Torbrook............	144	1287	2125
Weymouth..........	33	125	322
Bear River...........	224	116	2598
Deepbrook..........	19	128	391
Annapolis...........	19	125	1443
Williamstown........	9	79	624
Mochelle............	8	42	1006
Joggins.............	7	28	29
Lower Canard	6	100	115
Clarence.............	6	41	406
Brooklyn............	5	30	203
Gasperaux..........	4	30	30
Grandville Centre....	3	45	311
Round Hill..........	2	11	795
Lawrencetown......	2	20	429
Victoria Beach......	2	20	33
Moshers Cor.........	2	5	27
Canard..............	1	8	11
Upper Clements.....	1	1	107
Smith's Cove........	1	0	135
Upper Granville.....	1	9	179
Belle Isle...........	1	14	537
Corberrie...........	1	0	0
Paradise.............	1	9	224
Nictaux.............	1	4	107
Middleton..........	1	6	204
Victoria Vale........	1	3	39
Spa Springs.........	1	0	252
Port George.........	1	33	5
	307	2289	

Average increase, 7.45 new nests within 50 feet of each old nest found.

Average increase computed by the same method in 1914-15, 6.3.

Total number old nests found during the season in 1914-15, 85.

The large number of old nests found in Weymouth and Torbrook may be accounted for by the fact that these infestations have been running unhindered for three or four years and old nests of several previous years were of course still hanging on the tree.

The most disturbing feature of the work to date, is the bridging of the barrier of comparatively well sprayed orchards, extending from Wolfville, west to Middleton. This has previously served to protect the more poorly sprayed portion east of Wolfville. This may give rise to the development of a similar condition of affairs in the unsprayed portions of Hants Co., as exists at present in the western end of the Annapolis Valley. Furthermore, it seems only a question of time before the moths spread into the City of Halifax.

There is also to be reckoned with, a noticeable spread in Kings Co. Even in the best sprayed sections, there are growers who do not spray effectively and it is the orchards of these men that serve as a breeding ground for such pests. It is therefore obvious that the only way we can hope to keep this pest within bounds is by spraying, since inspection alone without such assistance, is helpless. When we consider that in Kings Co. alone there is a total acreage of about 18,000 acres, we realize how gigantic a task it would be to treat the pest in any other way than by regular and careful spraying. The need for continued and further propaganda work along this line, is thus greater than ever and should be vigorously prosecuted. This does not mean that we can dispense with the inspection hitherto carried on, for in addition to the fact that the inspectors have actually reduced the infestation during the past two years, they have done valuable educational work along the lines of more and better spraying. Being in touch with the latest information along these lines, they are in a position to give valuable advice. The co-operation of the Dominion Fruit Inspection staff and the officials of the United Fruit Cos., has been of material assistance to us in this work.

The Inspection of Nursery Stock.

The shipments of nursery stock during the past season have been still lighter than the preceding season, but the work of inspection was not made any lighter thereby. Such stock as arrived came, for the most part, in very small lots, and over a very long period. Owing to the chaotic condition of overland freight traffic it was not possible to confine the importation season to the period laid down in the regulations, since many comparitively large shipments were weeks or even months on the way. Thus a great deal of extra work had to be performed, in proportion to the size of the shipments and a relatively small sum was secured in the way of inspection fees viz. $170.30 for the spring season.

The result of our inspection has been that a number of firms with infested nurseries have discontinued shipping stock to Nova Scotia. Eventually it is hoped that exporters will cease to ship infested or questionable stock into the province. While there is no desire to exclude nursery stock from outside points, particularly as Nova Scotia is not in a position to supply all her own needs in this respect, the purchase, in as far as possible, from districts known to be free of dangerous pests, is strongly to be recommended.

With the present light shipments it is unnecessary to speak of improved facilities for this work, but with the return to normal, better facilities must be provided, particularly at Digby, where conditions are far from satisfactory.

No further orchard-to-orchard inspection was made this year. It is believed that the present state of the San Jose Scale in the province does not demand such an inspection more than one year in three. In any case such an inspection was out of the question this year, owing to the small staff and the great amount of other work engaging their attention. With the rigid inspection being carried on at the ports of entry it is not believed that we have much to fear at present from this source.

Experimental.

This is not the place to give detailed results of our experimental work, since these have been given in the various publications referred to in an earlier part of this report.

The work with the green apple bug (Lygus invitus var. novascotiensis Knight) and the apple maggot, (Rhagoletis pomonella) have reached such a state, that we felt justified in devoting a special bulletin to each of these pests.

Both these publications will fill a very real demand on the part of the fruit-growers, as definite and practical information regarding these pests has heretofore been lacking. Copies of the bulletins referred to are now on hand for general distribution.

Our experiments with the various species of orchard aphids continues and an account of our investigations to date is being prepared for publication. The different species of leaf hoppers that attack the apple have also engaged our attention and considerable progress made in our studies with regard to their life-histories and habits. The pear psylla (Psylla pyricola) has been discovered attacking pear trees in different parts of the Valley and a beginning has been made in the study of its life history and injuriousness in this province.

The series of experiments undertaken in co-operation with the Field Officer of the Dominion Entomological Branch on insecticide and fungicide combinations, has been continued. A series of orchards has been chosen at various parts of the Valley for testing these combinations on a commercial scale. In addition to this, an exhaustive study has been made in the laboratory of the killing value of the various combinations against several different insects. This has entailed an immense amount of work and much useful information has been gained. The work in this line, however, has only been commenced. A preliminary account giving the results of the investigations to date, will be found in the report of the N. S. Entomological Society for the current year.

The experiment being conducted at Bridgetown on the commercial value of spraying, is being continued. The returns for the present season are not yet in, but following the heavy crop of last year this season's crop is light and hence will not show the marked difference between the sprayed and unsprayed portion, that occurred last year. This experiment will be continued and at the end of the five year period, the returns from the sprayed and unsprayed plot will be averaged. This will doubtless show in a very convincing way, the great value of systematic spraying.

In view of the importance of the vegetable industry and the loss which it suffers from various insect pests, it would seem desirable that an investigation of some of the more injurious forms should be undertaken. It was our intention to recommend the establishment of a field laboratory at Yarmouth for this purpose. The present conditions, however, do not seem to favor the initiation of any new enterprises, and with our present staff any expansion is impossible. The various lines we are following offer great promise of valuable returns and we cannot afford to discontinue any of them. Anything that can be done to strengthen this part of the work still further, should not be left undone.

APIARY INSPECTION REPORT.

The following is the report of the inspection of apiaries for the past year, as prepared by Mr. Gooderham:

W. H. Brittain, B. S. A.,
Provincial Entomologist,
Truro, N. S.

Sir:—I have the honor to submit my first report as Apiary Inspector. It is a more or less detailed account of the work done during the past summer and also a summary of the present state of apiculture in the province.

Owing to the disease known as "American Foul Brood" having been found at Kentville two years ago by Mr. F. W. L. Sladen, Dominion Apiculturist, and again last year by Mr. Morley Pettitt, Provincial Apiculturist for Ontario, an Act, known as "The Foul Brood Act" was passed in this Province during the last session of the Legislature. The object of this Act is the prevention and treatment of diseases among bees.

As the Foul Brood had only been reported from the Cornwallis Valley it was thought best to make my headquarters at the provincial laboratory at Kentville, and work through the surrounding district first, making a thorough hive-to-hive inspection. Owing to other entomological work, I was unable to give my whole time to this inspection work till late in June. A long period of wet weather during apple blossoming time also hindered the work to some extent. An incomplete list of bee-keepers was also a drawback, as it often made it necessary to go over some of the ground twice.

The work was started at Kentville and a hive-to-hive inspection was carried on, east as far as Grand Pre, and south through Melanson and the Gaspereaux Valley. In this district only two light cases of Foul Brood were found, both in a Wolfville apiary, and these were treated at once by the owner. The district north of Kentville was next visited, through Church St., Canard and as far north as bees were kept. The disease was found to be scattered through all these places, but in most cases it is in a mild form, all of which can easily be treated and stamped out. A thorough inspection of every hive was carried on to find out as far as possible the extent of the diseased area. This area was found to extend as far as Wolfville and Colbrook on the south side and Woodside on the north, Canard and North Grand Pre on the east side, Centreville on the west. Outside of this area no signs of Foul Brood were found. Another disease known as "bald headed brood" was found in several places, but this is not of a very serious nature. Beemoth was also found in many localities.

The inspection was carried on through Kings and Hants Counties as far as St. Croix, then on to Amherst. Later on the west end of Kings Co., and Annapolis County, as far as Round Hill were inspected. The work had to be discontinued at this point for the year, owing to the lateness of the season. In all, 204 apiaries were visited, and 1554 colonies inspected. Of these a very small proportion were found to be affected with the disease.

As this is the first year for this kind of work, the administration of the Act was made as educational as possible in an effort to encourage our beekeepers to become more up-to-date in their methods, by doing away with the old box hives and transferring to movable frame hives. The appearance of disease and its treatment was explained, and the importance of everyone acting as his own inspector and reporting any suspicious case to the Provincial Entomologist or to an inspector, was pointed out. In all cases where disease is present and the bees kept in box hives or hives with immovable frames, transferring is necessary, as it is impossible to make a thorough inspection in such cases.

The extent of the disease has also been found and in many cases it has been successfully treated. This will aid in the work next year, as it will enable us to go direct to affected apiaries and treat them promptly.

I have been greatly helped and encouraged throughout the course of the inspection by Messrs. C. Hogan of Church St., and Mr. G. S. Pineo of Chipman's Corner, who have, on several occasions, given me freely of their time, and assisted me directly in the inspection work. Both of these gentlemen have treated several cases of foul brood in other apiaries during the summer. Mr. E. Duncanson of Gaspereaux also gave me invaluable assistance, by making out a complete list of beekeepers in the Gaspereaux Valley and Melanson. My thanks are also due to the many beekeepers who have, from time to time, given me lists of names of people who kept bees.

The following is a list of places visited with the number of colonies examined and number found to be diseased.

Colonies Inspected.

Locality	County	No. of Colonies Inspected	No. of Colonies Diseased
Amherst	Cumberland	68	0
Amherst Point	“	10	0
Avonport	Kings	6	0
Aylesford	“	46	0
Atlanta	“	5	1
Billtown	“	12	0
Berwick South	“	2	0
Brooklyn	Annapolis	24	0
Brickton	“	18	0
Bridgetown	“	38	0
Brooklyn St.	Kings	8	0
Canning	“	13	0
Centreville	“	6	4
Coldbrook	“	16	1
Canard	“	3	3
“ Upper	“	23	8
“ Lower	“	16	0
Chipman's Corner	“	48	2
Cambridge	“	14	0
Clarence	“	80	0
Falmouth	Hants	36	0
Grafton	Kings	48	0
Greenwood	“	42	0
Grand Pre	“	15	0
“ “ North	“	9	1
Gaspereaux	“	75	0
Greenwich	“	22	0
Hortonville	“	4	0
Hantsport	Hants	9	0
Habitant	Kings	2	0
Kentville	“	16	1
Kinsman's Corner	“	13	0
Kingston	“	18	0
“ North	“	84	0
Lawrencetown	Annapolis	32	0
Lakeville	Kings	4	0

Colonies Inspected (*continued*).

Locality	County	No. of Colonies Inspected	No. of Colonies Diseased
Melanson..........	Kings	14	0
Millville...........	"	7	0
Mt. Dennison.....	Hants	6	0
Melvern Sq........	Annapolis	37	0
Middleton.........	"	90	0
Nicteaux Falls.....	"	10	0
" West.....	"	8	0
Northville.........	Kings	11	0
Norths Corner.....	"	11	0
Nappan...........	Cumberland	3	0
Port Williams.....	Kings	71	11
Pereaux...........	"	40	0
Round Hill........	Annapolis	32	0
Steam Mill Village.	Kings	4	4
Starr's Point......	"	8	0
Sheffield Mills.....	"	7	5
Spa Springs........	Annapolis	18	0
St. Croix..........	Hants	38	0
Upper Dyke.......	Kings	8	1
Williamston........	"	39	0
Waterville.........	"	50	0
Waterville North..	"	15	0
Woodside..........	"	11	1
Woodville.........	"	6	0
Weston............	"	8	0
Wolfville..........	"	63	2
Wilmot............	Annapolis	54	0
Total.............		1554	45

It will be seen from the foregoing table that a very small number of colonies are affected with American Foul Brood, and that with the exception of the two very light cases at Wolfville and one at Colbrook, they are confined to a comparatively small area. This means that with a moderate amount of care this disease should be kept under control. To do this, a man who thoroughly understands the disease and its treatment should be placed in this district to make a thorough examination of every colony of bees kept, and also to aid as much as possible in the treatment of any diseases and in the transferring of bees from old box hives to movable frame hives. It will be his duty to see that every case of Foul Brood is treated and that bees kept in box hives, in apiaries where disease is found, shall be transferred to movable frame hives. He should be able to instruct the beekeepers in the care and handling of bees, explaining diseases and their treatment. Many of our beekeepers are not acquainted with the disease and have no idea how it should be treated. They should therefore have the necessary instruction.

Summary of the Present Status of Beekeeping.

Beekeeping in Nova Scotia has been sadly neglected, and it is only during the last few years that some of our beekeepers have realized the possibilities of honey production in this province, and have commenced building up larger apiaries and placing the business on a commercial basis. The opportunities for a large output of honey are great as there are enormous quantities of nectar going to waste each year for the lack of bees to gather it. Through parts of Colchester, Hants, Kings and Annapolis counties there are wide stretches of marsh lands, growing large crops of alsike clover, which is one of the best honey producing plants known. In some years, as in 1915, this crop is very large and an enormous quantity of honey is gathered from it. Fruit bloom also produces a fair amount of honey. Besides these, there are several other nectar secreting flowers, such as the Golden-rods, Wild Asters, Wild Radish, Fall Dandelion, Raspberry, Blackberry and many others. There are very few places in Nova Scotia where a fair honey crop might not be expected, and in the poorest years the crop is rarely a failure where proper care is given to the bees.

It is surprising to find that many of our beekeepers are still clinging to the old method of keeping bees in old-fashioned box hives or boxes without frames. There is no excuse for this, for bees do far better in the movable frame hive, more honey is produced and they are handled much more easily. In most cases where the boxes are used the bees have to be destroyed before the honey can be taken away, and it is a common practice to take a colony of bees in the fall and drown them out to get the honey. All this is done away with in the use of framed hives. The use of box hives also prevents a thorough inspection from being made. There are others who keep their bees in the frame hives, but when once in, they are never looked at again, except when a surplus box is put on in the spring, and taken off in the fall. This is just as bad as having them in the box hives, for the frames are immovable and cannot be examined. There are, however, a good many progressive men who are building up their apiaries under improved methods, using none but the movable frame hives, giving the bees all the attention necessary and keeping the apiary in a clean condition. These men are making a financial success of the business.

Throughout the province there are many people who are willing and anxious to start an apiary, but have no knowledge of how to commence, or of handling bees after they get them. Others who are keeping bees in box hives or immovable frame hives are desirous of transferring to movable frame hives, but have no idea of how to do it. Most of them have read literature on beekeeping, and yet hesitate to try for fear of making a failure. In cases like this, if a man who understands transferring and handling of bees were available to give assistance in the actual work, and to instruct the owners in the methods, I have no doubt but that the industry would grow and we would have more up-to-date beekeepers in the province. Our inspectors should be instructed in this work and should be able to render assistance if required, to any person who is desirous of transferring from box hives to movable frame hives and who does not understand the work. They should also be able to give assistance in the treatment of any disease, where the owner is not acquainted with the disease or its treatment.

At present it is impossible to do this with only one inspector, for if assistance is given it would mean that a large part of the province would not be visited during the summer. At least there should be one man to take charge of the diseased area, to see that the work there is thoroughly done, if Foul Brood is to be stamped out. There is abundance of work in other parts of the province inspecting and instructing in better methods of beekeeping.

In conclusion, I wish to thank you for the interest you have shown and the help you have given me in carrying out this apiary inspection work during the past summer.

Respectfully submitted,

C. B. GOODERHAM.

CONCLUSION.

It will be seen from the foregoing report that, though this department is a comparatively new one, the results of our activities are now becoming apparent. The value of much of the work, such as that having to do with the control of the Brown-tail Moth and the inspection of nursery stock, for San Jose Scale is probably not fully appreciated by the general public, since these pests have never been allowed to become serious. In the case of many of our native insects much harm has already been done and the working out of suitable control measures will make itself felt almost immediately.

I desire again to place on record, my personal appreciation of the interest that you have shown at all times in the progress of our work.

Respectfully submitted,

WILLIAM H. BRITTAIN.

PART 4—REPORT OF THE PROVINCIAL HORTICULTURIST.

M. Cumming, B. A., B. S. A.,
Secretary for Agriculture,
Truro, N. S.

The following is my annual report as Provincial Horticulturist for the year 1916:

The early part of the growing season just closed was cool, cloudy and wet. Rain fell on twenty three days through the months of May, June and July. On eight nights through May the thermometer reached 32 degrees, or below. On the 16th of May it fell to 23 degrees, on the 21st and 22nd to 27 degrees. There were no frosts in June. The blossoms of fruit trees were late in opening and no frost injury was observed. Eleven days during the first two weeks of June were dull or rainy. It was during this time that most fruit trees were in bloom, the dates for full bloom, at Wolfville for such varieties of apples as Gravenstein, Ribston, Stark and Golden Russet being on June 7th and 8th. The latter part of the season from August 1st onward was warm and dry. The warm-season vegetables, such as corn, tomatoes and squash, grew better during this time than earlier in the season. The heavy fall frosts held off until October 12th, allowing a long season for these tender crops.

The apple crop of the Province for 1916 was light, the crop for the fruit district being estimated at about 600,000 barrels. The crops for the six preceding years have been as follows:—

1910	323,008	barrels.
1911	1,734,876	"
1912	993,338	"
1913	650,901	"
1914	980,520	"
1915	613,882	"

If the yield for 1912 is taken as a fair average for good years it will be seen that there has been one good year and three rather poor years since 1912. While very few orchards bore full crops in these years of low yields, the lower lying area throughout the central part of the Annapolis Valley always appears to suffer more through short crops than do those sections on higher ground on either side of the Valley. The shortage in crop therefore in some orchards is much more pronounced than the figures for the total yield of the fruit district would indicate. It varies from a half to a third of a crop in some orchards down to practically no crop in others. The cause of short fruit crops has been ascribed to several different factors. Without doubt, the general care, as to cultivating, fertilizing, pruning and spraying, which an orchard receives has much to do with the size of the crops which it will produce. Some orchardists who give their trees proper attention seldom have a failure in crop. Their orchards, however, are usually on elevated sites. At the same time other orchards equally well cared for but on lower levels fail. It would seem that the kind of weather, especially at blossoming time, to a large extent, determines whether the crop shall be a good one or not and unfavorable weather seems to affect the orchards on the lower levels first. The weather also during the preceding season and other conditions affecting the formation of blossom buds will have much to do with the amount of bloom.

Sometimes a single frost at blossoming time, or perhaps two frosts, may be responsible for the damage to the crop, or a period of cold, dull, wet weather may prevent the normal setting of the fruit. In the first instance when a frost is the cause of the injury and the weather conditions are otherwise favorable, orchard heating might profitably be practised. Tests at the Agricultural College have shown that it is practicable to raise the temperature five or seven degrees in an orchard during the night of a frost. But the difficulty is that in our climate the unfavorable weather conditions, when they occur, often extend over a period of several days, the damage not always being done in a single night. In such cases the orchardist is helpless. The only thing he can do is to give the orchard the best general care possible and if his situation is such that his crop often fails he should carry on some other line of farming along with his orcharding.

The Model Orchards.

There are now thirty six model orchards in the Province. These are situated outside the fruit district and distributed over the Province from Yarmouth to Cape Breton. The majority of these orchards have made satisfactory progress, indicating the possibility of successfully growing apples, at least for home use and the local markets, in different parts of Nova Scotia. From the first, of course, it was not expected that they would all thrive equally well. The conditions for orcharding in Nova Scotia are too variable for this. Even those which do not promise the best success so far as yields are concerned have been of value in pointing out the difficulties to be overcome in the growing of tree fruits in certain localities. It is now possible to recommend to intending planters the varieties most likely to succeed in their sections.

In some instances the deaths of the owners of model orchards have made it difficult or nearly impossible to carry out the terms of the original contract. The sale of properties has sometimes resulted in the ownership being transferred to one who has not the same interest in the orchard as the first owner had. Two owners are now with the Canadian Expeditionary Forces at the front. The shortage of the labor supply due to economic conditions makes it difficult in some cases to get the necessary work done. Because of these disadvantages and the fact that the orchards are scattered over a wide area it has been an advantage lately to have the help through the summer of two assistants, Mr. W. N. Byers of New Annan, Colchester County and Mr. F. B. Kinsman of Lakeville, Kings County. Both are graduates of the Nova Scotia Agricultural College and earnest, energetic young men.

Some sections of the Province which give promise of being adapted for the growing of apples and other tree fruits, as judged by the present development of the model orchards, are Falkland Ridge in Annapolis County, New Germany and Bridgewater in Lunenburg County, Caledonia and Brookfield in the northern, and Milton in the southern part of Queens County, Sable River and Welshtown in Shelburne County, South Deerfield in Yarmouth County, Bear River, in Digby County, Gore in Hants County, Great Village and New Annan in Colchester County, Avondale in Pictou County, Lochaber in Antigonish County, West Bay and Loch Side in Richmond County, Enon in Cape Breton County, Whycocomagh and Black River in Inverness County.

Mr. John Brown, West Lochaber, Antigonish County, who reports a yield of 45 barrels of apples this season and 12 bushels of plums says: "The orchard is looking well and people take notice of it as they pass along. My neighbors are beginning to think that it is a good thing."

Some of the other model orchards in 1916 yielded as follows:

Falkland Ridge	40 barrels apples
New Germany	36 " "
Bridgewater	20 " "
South Deerfield	35 " "
Gore, Hants County	25 " "
West Bay, Richmond	20 " "

In the model orchard at Sable River, Shelburne County, owned by Mr. James Harlow, about one third of an acre was planted to gooseberries and currants in 1910. The varieties were Downing and Industry gooseberry and Cherry currant. Mr. Harlow has picked several good crops from this bush fruit plantation. Last year it yielded 1100 quarts of gooseberries and 500 quarts of currants which were sold, for the most part locally, at paying prices. A larger quantity of such fruits than is now grown should be produced and consumed in rural communities.

Demonstration Orchards.

In 1914 the division of horticulture entered into agreements with the owners of seven orchards of bearing age for the purpose of giving a demonstration of the effects of orchard renovation methods on the yields of fruit. These orchards are owned by Mr. Emery De Long, Barss Corner, Lunenburg Co., Mr. Wynn A. Crouse, Bridgewater, N. S., Mr. D. M. Brown, Pugwash, Cumberland Co., Rev. J. H. Semery, Hectanooga, Yarmouth County, Mr. Thos. H. H. Fortier, Annapolis, Mr. Fred M. Taylor, Williamsdale, Cumberland Co., Mr. J. E. McFarlane, Orangedale, Inverness Co. The orchards are mostly from one to two acres in extent, the one at Hectanooga consisting of about four acres. The usual treatment of pruning, spraying, tilling and fertilizing was given in each case and while there has been an improvement in the health and growth of the trees and in the yield of fruit, the seasons since 1914 have not been favorable for large yields.

Mr. Crouse reports a yield of 76 barrels for 1916, which is about the same as on the preceding year, but not as large a yield as in 1914. The crop each year, since the demonstration began, however, is better than on any year previous to the time of starting the work of renovation.

Mr. D. M. Brown reports a yield of 50 barrels for 1916, the largest crop he has ever had. The growth of the trees is strong and healthy. Mr. Fred M. Taylor, Williamsdale, obtained a crop of 54 barrels this year from his orchard and he reports that his trees have made good growth.

Demonstration Vegetable Gardens.

It is often a problem with farmers engaged in the work of growing the usual farm crops to find time for the proper cultivation of their fruit trees. The growing of vegetable garden crops in a young orchard insures the trees getting sufficient tillage and fertilizing. Partly with a view to giving the orchards the necessary tillage and partly to illustrate the growing of vegetable crops and to impress on people the value of a variety of vegetables in their diet, seven demonstration vegetable gardens were started and carried on, one at each of the following places: Barss Corner, Lunenburg County; Kempt, Queens County; Bridgewater, Lunenburg County; Great Village, and Upper Stewiacke, Colchester County; Whycocomagh, Inverness County and Loch Side, Richmond County.

Demonstration Vegetable Garden at Great Village.

The plan was to plant enough of each of the most important vegetables to supply the family throughout the season, allowing for a small surplus of some kinds to be disposed of as the owner wished. The first row of vegetables was placed five feet from the adjoining row of trees to allow of tillage of the tree strip with the harrow or cultivator. The trees being 30 feet apart, a strip remained for vegetables 20 feet in width between each two rows of trees. The vegetables were mostly planted in rows 30 inches apart. The following is the plan of the gardens:

5′
Apple tree row
5′

1½′
Turnip Swede
2½′
“ “
2½′
Beet, Egyptian or Crimson Globe
2½′
Beet, Long Dark Red
20′ 2½′
Carrot, Chantenay or Danvers Half Long
2½′
“ “ “ “ “
2½′
Parsnip, Student or Abbott's Hollow Crowned
2½′
“ “ “ “ “
2½′

5′
Apple tree row
5′

1½′
Early cabbage ½ row, Late cabbage ½ row
2½′
Late cabbage
2½′
Early peas, Nott's Excelsior or American Wonder
2½′
Bush beans
20′ 2½′
Tomatoes ⅓ row, Sweet Corn ⅔ row
2½′
Spinach and Swiss Chard, ⅓ row, Sweet Corn ⅔ row
2½′
Onion sets, radish and lettuce
2½′
Cucumbers, squash and pumpkin
1½′

5′
Apple tree row
5′

The rows were 150 to 300 feet in length, according to the space available for the purpose. The following list of seeds is about what might be required for a garden 40 x 300 feet, certain varieties being suggested, although there are others which are just as good.

Beans, Refugee	½ lb.	.20
“ Wardwell's Kidney wax	½ lb.	.20
Beets, Crosby Early Egyptian	4 oz 8 oz	.60
“ Long Dark Red	4 oz	.45
Carrots, Chantenay	2 oz	.40
Cabbage, Danish Ball Head	1 package	.10
Cabbage, Early Jersey Wakefield	½ oz.	.10
Corn, Gorden Bantam 1 pkge)		
“ White Cory 1 pkge)	2 pkges or ½ pint	.20
Cucumber, White Spine	½ oz.	.10
Lettuce, Grand Rapids Forcing	½ oz.	.05
Onions, Yellow Danvers	1 oz.	.40
“ sets	1 lb.	.20
Parsnips, Student or Abbott's	4 oz.	.25
Peas, Nott's Excelsior	1 lb.	.30
“ Gradus	1 lb.	.35
Pumpkin, sugar	½ oz	.05
Radish, Non Plus Ultra	½ oz	.05
Spinach, Victoria	1 oz	.10
Squash, Hubbard	½ oz	.05
Swiss Chard	2 oz	.20
Tomato, Earliana	1 pkg.	.10
Turnip (Swede), Holborn Invicta	2 oz.	.10
		———$4.55

Mr. A. D. MacDonald, Whycocomagh reports:— "Everything in the garden was very satisfactory this year. "Twenty four plants yielded 3¾ bushels of tomatoes. We "harvested about 500 lbs. of cabbage, 8 bushels of beets, 4 "bushels of carrots, 2 bushels parsnips, 3 bushels of cucumbers. The corn was late, but owing to the favorable "fall yielded well. It kept us in table corn for several "weeks. The peas and beans grew well, and we canned "considerable of them. Spinach did not do well, but Swiss "Chard did splendidly. Onions yielded over half a bushel. "Radish and lettuce also were a good crop."

Mr. A. D. McCuish, Loch Side, reports:—"I did not "keep a record of the yield of the vegetable garden, but "can give a fair statement of the product. There were 45 "cabbage averaging 10 lbs. each, 3 bushels of tomatoes, "2 bushels beets, 2 bushels of carrots, 1 bushel parsnips, "2 gallons of peas in the fall after using green peas through "the season. Black beans gave good returns, filling and "ripening well. White beans grew well, but did not ripen "well. The pumpkins and squash succeeded well. Two "barrels were shipped to Sydney, besides what was used "at home and given to friends. Lettuce grew fine.

"Considering that this plot was not intended for a "vegetable garden and was not plowed deep enough, nor was "it rich enough, and being my first attempt at gardening, "it turned out very well."

Mr. W. A. Crouse, Bridgewater, says:—"I can report "for the garden a fair yield. Some kinds of vegetable "were a complete failure, while others were extra good. "The cucumbers and squash failed, but the peas, tomatoes, "onions, carrots, beets and one variety of beans were "unusually good. The other vegetables were fair."

Mr. A. B. Geddes, Great Village, Colchester County, reports that the peas, tomatoes, sweet corn, beets, Swiss Chard, cucumbers, lettuce and radish, yielded well. The other crops were fair or poor.

Mr. F. L. Fulton, Upper Stewiacke, reports a yield from his garden of 16 bus. turnips, 10 bus. beets, 2 bus. corrots, 2 bus. parsnips, 5 bus. tomatoes, 90 head cabbage, 95 head cauliflowers, 80 qts. string beens, 10 qts. shelled beans, 60 qts. peas, 40 squash, 20 pumpkins, 75 lbs. onions, with good returns from corn, greens and cucumbers.

Horticulture at the Agriculture College.

At the Agricultural College, Truro, the horticultural work consists, in part, in the development and the maintenance of the college grounds including the lawn with its shrub and flower borders, the culture of the demonstration orchard and vegetable garden and the experiments being carried on at Plundell truck garden farm. This work is largely under the care of Mr. James Allan, the Horticultural Superintendent. On account of the large amount of grading involved in the construction of the new science building and the removal of the top soil from a considerable area much work has been required to develop a lawn on this piece of ground. Likewise the area devoted to the vegetable garden consists of subsoil several feet in depth, moved from the site of the science building. It will require time to bring this into an ideal state for garden purposes. The chief object of carrying on this garden is to give a demonstration to visitors and Rural Science students of the culture of all the different vegetables which it is possible to grow in a home garden in Nova Scotia, to have the product for illustrative purposes at exhibitions and for use in the demonstrations on the canning of vegetables at the college. With regard to the lawn and vegetable garden Mr. Allan reports as follows:—

"In the spring of 1916 before the regular garden work "began an attempt was made to get as much permanent "grading done around the New Science Building as possible. "Through the summer every available opportunity was "taken to advance this work when it would not interfere "with the regular garden work. By early fall the grounds "had been all surveyed, graded and seeded down with a "nurse crop except a small piece in the rear of the Science "Building on which it has been proposed to have a tennis "court.

"The grading west of the Horticultural Building and "north of the Vegetable Garden was completed and seeded "to grass with a nurse crop. With some further contem-"plated improvements the grass embankment here will "become a very attractive part of the grounds.

"Evergreens were planted on the north side of the "Horticultural Building and also some specimen ever-"greens on the part of the lawn opposite the front entrance "to the Building.

"Plantings of larch and poplar were made at the rear of "the farm cottages, round the North side of the Horse Barn, "and on the East side of the Vegetable Garden up to the "Greenhouse.

"On the West side of the College Orchard two rows of "Pinus Sylvestris which were saved from the rows in front "of the Science Building. were set out; also several irregular "blocks of this evergreen were set out near this spot."

"Around the East end of the Main College Building "a planting of deciduous flowering shrubs was made, forming a continuation of the front planting. The shrubs "have become very well established."

Perennial Borders and Flower Beds.

The Perennial borders grew well and produced a very good show of bloom but suffered much from drought in midsummer. Astilbe magenta, and Gypsophila paniculata and Iris Germanica var. maguet, died out through the winter of 1915-16 apparently from winter killing although the iris is considered hardy. The following herbaceous perennials were added to the border in 1916: Camanula Persicifolia, P. Persicifolia alba, Chrysanthemum coccineum and Oenothera Youngii. Several species of liliums were planted in the fall of 1915. In July 1916 the seed of forty three varieties of perennials was sown and the seedlings transplanted to a cold frame for the winter. Those which survive will be planted out in the border in the spring to fill up the blanks caused by the winter killing.

A few new flower beds were made this spring, and along with existing ones were planted with annuals raised from seed and with other bedding plants. Most of these beds were planted with tulips in the fall of 1916 for next spring's bloom.

Exhibit of Nova Scotia Apples at Cornell.

At the suggestion of W. H. Chandler, Professor of Horticulture, Cornell University, an exchange was made with the Horticultural Department at Cornell, of samples of Nova Scotia apples for apples grown in New York State. In October Mr. W. N. Byers collected from a few growers at Waterville and Lakeville, Kings County samples of twenty one varieties which were sent to Cornell and exhibited at the Tenth Annual Fruit Show at that institution. Eighteen prizes were awarded the Nova Scotia apples as follows:

Name	Variety	Prize
A. S. Banks, Waterville	Banks Red	1st Prize
	Cox Orange	"
	Red Stark	"
	Red Ribston	"
	Red Gravenstein	"
H. Watts, Waterville	Fallawater	"
	Ontario	"
	Tolman	"
	Wellington	"
J. A. Kinsman, Lakeville	McIntosh Red	"
	Stark	"
J. Buchanan, Waterville	Greening	"
	Golden Russet	2nd Prize
	King	"
	St. Lawrence	"
Palmer Bros., Windsor Forks	Spy	1st "
E. H. Sangster, Falmouth	Ben Davis	4th "
Wm. O'Brien, Windsor Forks	Yellow Bellflower	1st Prize

The following seven varieties had no competition: Gravenstein, Red Stark, Cox Orange, Red Ribston, St. Lawrence, Banks and Wellington.

The other varieties were in competition with apples grown in practically all of the best apple growing sections of the United States. The judges were impressed by "the excellent quality and particularly the color."

Mushrooms.

Three beds of mushrooms were started in the cellar of the Horticultural Building in the latter part of the season of 1916. The first was spawned July 27th and came into bearing about September 15th. Three different kinds of mushroom spawn were used, the Milltrack, Standard and Direct. Of these the Standard and Direct gave yields of 14.7 ozs. and 11.9 ozs. per square foot respectively while the Milltrack yielded only 6.2 ozs. per square foot. The beds continued in bearing until December 31st. The cost of materials including spawn and labor in preparing the mushroom beds was about 10 cents per square foot. Mushrooms bring from 25 to 40 cents per pound and consequently yield a profit when one is successful in growing the crop.

Plumdell Orchard.

The five-acre apple orchard planted at Plumdell in 1914 has made good growth and generally withstood the winters very well. Seven trees of the Milwaukee variety were winter killed in 1915-16. Strips six feet in width along the tree rows in this orchard are kept cultivated early in the season and sown to cover crop in July. The remainder of the ground is under a three year rotation of rye, clover and potatoes. Three strips are fertilized each year in this orchard with basic slag, three with acid phosphate and three with bone meal, three being left as checks. The object is to find out the relative values of these three fertilizers as sources for phosphoric acid in the growing of clover. It will be possible at the same time to note the effect of these fertilizers on the potato crop.

In the strawberry plot of 1¼ acres a test was made of twelve varieties. The yields of these varieties were as follows:—

Variety	Yield per acre.
Bisel	8127
Corsican	6772
Morning Star	6284
Three W's	6230
Bubach	6095
Brandywine	5544
Sample	5008
Senator Dunlap	4543
Wm. Belt,	4425
Gandy	3984
Glen Mary	3663
Mead	3606

Four English varieties, Royal Sovereign, Scarlet Queen, Fillbasket, and Sir Joseph Paxton were tried along with the American varieties. As tested here they have shown themselves evidently not adapted to our climate, the yields being only a few quarts to a row.

Of the American varieties Senator Dunlap is the one most commonly recommended for planting in this Province. It is a staminate variety, with medium to large sized fruit, early and of good quality. The plant is hardy, vigorous and generally considered a good bearer. In one year's test here it has not done as well as some others. The yield given above for Senator Dunlap is an average of the yields of two plots calculated for an acre. But the yields of these two plots were as variable as the yields of different varieties, being 102 and 186½ boxes. Both these plots were the same size. Similarly the yields of Glen Mary, Wm. Belt, Three W's, and Corsican were quite different on different plots, although the land, as far as could be told, was uniform. This shows that correct conclusions as to the merits of varieties cannot be drawn until many tests have been made on a number of plots for several years. The variety Bisel was on the outside of the strawberry field which may account for the larger yield of this variety than of the others.

A one-acre block of pear, plum and cherry trees was planted on the brow of the hill just below the apple orchard at Plumdell in 1916. The trees were planted 15 ft. by 15 ft. apart, and include 42 pears, 70 plums and 56 cherries. Some of this nursery stock was imported from England and some came from American firms. There was much loss in the American stock, probably due partly to fumigation and partly to the long time the trees were on the way.

The Nursery.

A nursery of ornamental and fruit trees and bushes has been started at Plumdell with a view to finding out what kinds are hardy here and what nursery practice is practicable. Apples, pears, plums, cherries, the bush fruits, ornamental trees, deciduous and evergreen, roses and other shrubs are included in the Nursery. All the stock came through the winter of 1915-16 in good condition except some of the plums and cherries. Mariana and Black Damask plum stock and Mazzard cherry stock were winter killed. The Myrobolan plum and Mahaleb cherry stocks seem to be hardier and survived.

Hardwood cuttings of currants and other bushes were planted in the nursery rows this fall. Some of these cuttings became well rooted before winter set in. A number of gooseberries were successfully layered in the latter part of the summer.

The Growing of Vegetable Seeds.

On account of the regular supply of certain kinds of garden seeds being interfered with by the war an effort has been made to see what kinds can be successfully grown in this country. Beginning in 1914 with the growing of parsnip and turnip seed, in 1915 and 1916 plantings were made of these and of beets and carrots. The best success was obtained with the first two, although good beet and carrot seed has been matured. From a plot of .022 acre, 2½ pounds of cleaned carrot seed was obtained. From a plot of .075 acre 46 pounds of turnip seed and from a plat of .033 acre

8½ pounds of cleaned parsnip seed was obtained. The yield of parsnip seed was decreased by the parsnip web worm. Good crops of turnips and parsnips have been grown from our own seed during the past two years.

Club Root of Cabbage and Turnips.

A piece of ground at the south end of Plumdell farm was so badly infested with the Clubroot disease in 1915 that the crop of cabbage planted on it was a complete failure in that year. In order to determine the effect of lime in preventing this disease the ground was laid off in plots in 1916 and treated with different quantities of ground limestone and of burnt lime. On each plot 3 rows of cabbages were set out and four rows of turnips (Swedes) were sown. The rows were 3 feet apart and the roots were thinned to about 12 inches in the row. The cabbage plants were 3 feet apart in the rows. The usual cultivation was given during the season.

The results on 8 limed and 2 check plots were as follows:

Percentage free from Clubroot	BURNT LIME PLOTS		CRUSHED LIME STONE PLOTS				CHECK PLOTS	
	4½t. per acre	9t. per acre	4t. per acre	6t. per acre	8t. per acre	12t. per acre.		
1. Cabbage..........	44	80	15	51	33	72	39	0
2. Turnips...........	73	85	75	75	78	81	56	66

Comparison of burnt lime with its equivalent of crushed limestone.

Eight tons crushed limestone is chemically equivalent to 8960 lbs. or almost 4½ tons burnt lime.

Percentage free from clubroot in

	4½ tons Burnt Lime.	8 tons Crushed Limestone.
1. Cabbage................	44	33
2. Turnips.................	73	78

From these results it would appear that applications of burnt lime or ground limestone have the effect of controlling the clubroot. The results as to the merits of burnt lime and crushed limestone are conflicting. The test will be repeated.

Potato Seed Selection.

Work in the selection of seed potatoes was started with Irish Cobbler, Dreer's Standard and Garnet Chili, following the direction of the Canadian Seed Growers' Association. The object was to obtain a high yielding strain and one which would give tubers true to a certain type.

Selected hills of each of the above named varieties saved from the 1915 crop grown at Plumdell farm were weighed and the small tubers and those considered not true to type discarded. The remaining tubers were cut into pieces weighing from one to two ounces each. The seed from each original hill was planted separate from that from the other hills. The land had received a liberal application of manure for cabbage two years before and was fallow in 1915. It was plowed in the fall of 1915 and again in the spring and given the usual preparation for a potato crop. The rows were three feet apart and the sets one foot apart in the row. The crop was given the usual tillage and was sprayed four times with Bordeaux mixture, 4-4-40, and 2½ pounds of arsenate of lead to 40 gallons of the mixture.

The original hills of Garnet Chili, Dreer's Standard and Irish Cobbler used for seed were marked with the letters A, B and C respectively, the Garnet Chili plants of 1916 being marked from 1A up to 10A, the Dreer's Standard from 1B up to 10B and the Irish Cobbler from 1C up to 10C. The following is a summary of the results for the 1916 work with these potato plots.

Original Hill	Gross Weight	Dis-carded	Net Weight	No. of Tubers	No. of Sets.	Weight of Smallest Hill.	Weight of Largest Hill.	Average Weight of all Hills 1916.
1A	23 oz	5 oz.	18 oz.	3	9	10 oz.	22½oz.	15 oz.
2A	26½ "	12½ "	14 "	2	9	1½ "	22½ "	14.4 "
3A	20 "	5 "	5 "	3	11	5 "	22½ "	14.5 "
4A	24 "	8 "	16 "	3	9	7½ "	26 "	19. "
5A	25 "	6½ "	18½ "	3	12	7 "	29½ "	16. "
6A	28 "	11 "	17 "	3	10	15 "	22½ "	19.4 "
7A	38 "	6 "	17 "	3	12	10½ "	28 "	19. "
8A	24½ "	13 "	11½ "	2	8	10½ "	24½ "	17.5 "
9A	33½ "	16½ "	17 "	3	12	9 "	35½ "	21.2 "
10A	37 "	15 "	22 "	3	12	4½ "	24 "	17.6 "
1B	41 "	8½ "	32½ "	5	27	6 "	34 "	20.8 "
2B	36 "	9 "	27 "	5	21	14½ "	38½ "	26. "
3B	36 "	5 "	31 "	5	20	15 "	40½ "	30.1 "
4B	29½ "	7 "	22½ "	4	17	1½ "	28 "	19.3 "
5B	57 "	11½ "	45½ "	6	30	5½ "	43 "	22.5 "
6B	32 "	13½ "	19½ "	3	16	14 "	38½ "	24.7 "
7B	39 "	17 "	22 "	4	19	9 "	43½ "	29. "
8B	55 "	15 "	40 "	7	34	3½ "	3½ "	3.5 "
9B	41 "	9½ "	31½ "	5	23	7 "	45 "	21.8 "
10B	45 "	19 "	26 "	4	19	12 "	48½ "	25.3 "
1C	30 "	11 "	19 "	3	12	6 "	11½ "	9.5 "
2C	27 "	8 "	19 "	3	13	7 "	30 "	22.5 "
3C	35½ "	17 "	18½ "	3	12	15 "	34 "	26 "
4C	30 "	14 "	16 "	3	13	10½ "	30 "	22.5 "
5C	38 "	19 "	19 "	3	11	15½ "	30 "	23.5 "
6C	37 "	9 "	28 "	4	20	6 "	34 "	13.4 "
7C	28½ "	5½ "	23 "	3	12	13 "	36½ "	25.4 "
8C	39 "	11 "	28 "	3	14	20 "	32 "	26. "
9C	28 "	11 "	17 "	4	14	17½ "	34 "	26. "
10C	30½ "	5 "	25½ "	5	17	15 "	35 "	23.1 "

The original hills which were used for seed in 1916 were among the best yielding hills of the crop at Plumdell farm in 1915. As far as was known they were free from disease, although they had not been inspected during the growing season to determine this point. In the absence of any evidence to the contrary it is fair to assume that they were from healthy plants.

The potato plots of the 1916 crop were inspected on August 7th by Mr. W. K. McCulloch, an official employed by the Dominion Division of Botany. It was found that only seven of the thirty plots were free from disease, 1A, 2B, 3B, 7B, 7C, 8C, and 10C. Sixteen plots were more or less affected with leaf roll, 2A, 3A, 4A, 5A, 6A, 7A, 8A, 9A, 10A, 1B, 4B, 9B, 10B, 1C, 6C, 9C. The following plots were more or less affected with blackleg: 4B, 5B, 6B, 10B, 4C, 5C. The following with curly dwarf: 8B, 1C. The following with rhizoctonia: 2C, 3C, 5C. Mosiac disease was found in plot 5B.

The diseases were not observed to bear any particular relation to soil or variety. They seemed to appear suddenly on plants which were grown from what was believed to be healthy seed stock.

It will also be noticed that the highest yielding hill of seed potatoes did not give the highest average yield per hill in the crop grown from this seed. Nor were the smallest averages of hills obtained from those grown from seed from the lowest yielding hills. In this connection the conclusions of Mr. F. C. Stewart of the Geneva Experiment Station are interesting. Investigations of potato yields and diseases were carried on at that Station for several years and reported in Geneva Station Bulletin No. 422 in 1916.

Mr. Stewart's conclusions were as follows:

"1. Neither normal foliage nor high yield is a guarantee of productivity in the progeny of the following season. Degeneration may occur quite suddenly.

"2. It is unsafe to select seed potatoes from fields containing many degenerate plants. Even the normal plants from such fields are liable to produce worthless progeny.

"3. Mosiac threatens to become an important factor in the production of seed potatoes. It is transmitted through the seed.

"4. It is doubtful if any method of seed selection will prevent the "running out" of seed potatoes under certain conditions."

As far as the work has been carried on here it seems to confirm the above conclusions. The work will be continued.

Tomato Crops.

For several years tests have been made by the Horticultural Division to determine the best time at which to make sowings of tomatoes for plantings in the field or garden. The time to sow will, of course, depend on the time at which the tomato plants can safely be set out in the open, which at Truro is usually not until between the 18th and 21st of June. It will also depend to some extent on the relative market value of the early crop of ripe fruit as compared with the main crop—at least so far as regards the Eastern part of the Province. Plants started from early sown seed and properly handled produce the earliest fruit. They require more transplantings, or pottings, and protection for a longer time from low temperatures before being planted out in the field than do plants from later sown seeds. Hence they cost more to raise than the latter.

Method of Raising.

For April sowings, plants raised in pots have given smaller yields of both green and ripe fruit than plants twice transplanted in flats. With plants once transplanted in flats, the results are against potting too, though they are not too conclusive. If the extra expense for pots and the extra labor for twice potting is taken into account as compared with once transplanting in flats, it has been found that transplanting in flats pays better than potting, at least for April sowings.

Plants grown from early March sowings and potted on to 5-inch pots have given much higher yields both of ripe and green fruit than plants twice transplanted in flats of the early April sowings. They also yielded the earliest ripe fruit. This potting method cannot be recommended for commercial purposes, as it involves much extra labor both in potting and handling and in care and attention, as the plants are carried at least four weeks longer under glass than in the April sowings. It might be advisable for a private garden.

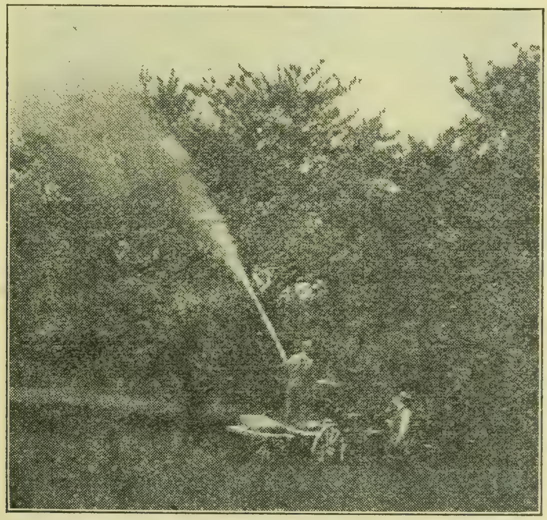
If the potting method is to be followed, the sowings should be made early in March and the seedlings potted into 2½ inch pots, and then shifted when ready into 4-inch and 5-inch or even 6-inch pots, as may be found necessary. At planting out time they will be large plants with fruit set.

Plants, then, for commercial purposes should be grown in flats and transplanted once or twice. Twice transplanting has given a much larger yield both of ripe and green fruit than has once transplanting. Even allowing for the extra expense involved in twice transplanting, it has returned a profit at the rate of more than $20.00 an acre on a conservative estimate over once transplanting.

It is recommended that if two transplantings are to be given sowings be made from 29th March to 19th April with April 12th as the best date to obtain the stockiest plants. If only one transplanting is to be given, sow from 5th to 19th April and transplant the seedlings to flats at 3″ x 3″ apart. April 12th is probably the best date to obtain the stockiest plants. This is for the neighborhood of Truro. In the western part of the Province the dates would be from one to two weeks earlier, and for the Eastern part either the same date as for Truro or later depending on whether the season opens at the same or at a later date.

Dusting of Fruit Trees.

The value of sulphur for the control of fungous diseases on plants in greenhouses has long been known. Of late sulphur dust has been used with apparent success in the control of black spot on fruit trees. With a view to trying the method of dusting for the control of black spot on apple trees a small hand dusting outfit and prepared dusting material were purchased from an American firm last spring. The dusting mixture consists of very finely ground sulphur containing 15 per cent arsenate of lead. A test was made on a row of McIntosh Red trees in the college orchard. The outfit was late in arriving so that the first application of dust could not be put on until June 9th. The second was applied on June 16th the third on June 23rd and a fourth



Applying a Dust Spray of Sulphur in N. Y. State.

early in July. There was little fruit on the trees, but the foliage of the dusted trees was freer of spot than that of the adjacent trees sprayed three times with lime sulphur. A more thorough test will be made next season when the dusting operations can begin earlier in the season.

Comparison of British Columbia Grown Bulbs and Holland Bulbs.

Through the kindness of Mr. Lionel Stevenson, B. S. A., Superintendent of Experimental Station at Sydney, B. C. a number of British Columbia grown bulbs were sent here from that station. They were tested out in our Plumdell grounds against bulbs which had been grown in Holland and imported here. The results are as follows:—

Variety	No. of B. C. bulbs planted	No. of Holland bulbs planted.	Missed. No bloom but good foilage. B. C.	Hol.	Missed altogether or blank B. C.	Hol.
Pottebakker red.......	5	6	0	6	1	0
Pottebakker white.....	5	6	0	1	1	0
La Reine.............	8	9	0	0	0	2
Artus................	10	11	0	0	2	0
Joost van Vondel......	10	12	0	0	0	0
Crysolora.............	20	20	0	0	6	0
Duchesse de Parma....	20	20	0	0	5	1

	B. C. Bulbs	Holland Bulbs.
Date of planting.......	19 October 1915	19 October 1915
Date on which growth appeared........	24 April 1916.	27 April 1916.
Date on which bloom commenced......	16-17 May 1916	18 May 1916.
In full bloom...........	26 May 1916.	26 May 1916.
Date on which bloom finished.........		
La Reine......	6 June 1916.	7 June 1916.
Chrysolora.....	8 June 1916.	"
Artus.........	10 June 1916.	"
All others	7 June 1916.	"

The size of the blooms on the B. C. bulbs seems to be heavier, and the foliage was somewhat stronger and healthier. After the petals fell, the seed pods developed; and after an interval of 10 days, the pods of the B. C. bulbs appeared to be heavier. The seed pods were then cut off to give the bulbs a chance to develop. The ground was cultivated until the bulbs matured, when they were taken up.

The Horticultural Superintendent's Cottage.

During the year a cottage has been erected at the south eastern corner of the college grounds for the use of the Horticultural Superintendent. This is a much needed improvement as it brings the Superintendent nearer his work, especially in winter time when the greenhouses need attention at night.

At the Short Course held at the Agricultural College in January assistance in the horticultural part of the program was received from the following: Professor W. S. Blair, Director, Experimental Station, Kentville; Mr. G. H. Vroom, Chief Fruit Inspector for Nova Scotia; Mr. P. J. Carey, Dominion Fruit Inspector, Toronto; Mr. M. K. Ells, Port Williams, and Mr. F. W. Foster, Kingston. For their kind co-operation in this work, I wish to extend to each my sincere thanks.

Respectfully submitted,

P. J. Shaw.

PART 5—REPORT OF THE PROFESSOR OF AGRICULTURE AND FARM SUPERINTENDENT.

Principal Cumming,
Secretary for Agriculture.

Sir:—I have the honor to submit herewith the Annual report of the Nova Scotia Agricultural College Farm for the year 1916.

In general the work of the year has been quite satisfactory. The weather in the spring was more favorable for getting work done, especially the month of May than in 1915. Hay and grain crops were good, the hay being especially heavy. The weather for harvesting both hay and grain was excellent, and both were cured and put in the barn with less trouble than usual.

Root crops were fairly good. Mangels gave a heavier crop than for many years. Turnips yielded well although; the dry weather in September checked them to some extent, and black rot and club-root caused considerable damage on parts of the field.

The health of the animals on the farm has been unusually good. No sickness of any kind occurred among the horses, although there was some loss of colts at foaling time. The Bang system of caring for cattle that have reacted to the tuberculin test is still in use. The number of reacting cattle has been gradually reduced, until at the present time only fourteen reactors are left on the farm. If the present success with the non-reacting herd is maintained we will soon have nothing but non-reacting cattle on the place, and will have added to our herd a large number of valuable stock, the offspring of the reacting cows under the Bang treatment. It will be remembered by those reading earlier reports that the Bang system consists of removing reacting cows to some distance from the main herd where they are kept from coming in contact with all other cattle. The calves from these cows are removed from their dams as soon as dropped and placed in another barn, where they will be free from all chance of contracting any disease. Later they are tested and thus far from twenty-eight such calves tested, only two have been found to react to the tuberculin test in the past three years. The system has thus proved of immense value to the College in preserving the blood of valuable cows that were reactors.

Crop Report.

In the rotation in use on the College Farm oats generally follow roots. Part of the oats grown in 1916 were on the root land and part on corn land. The variety plots on the root land vary greatly in yield. This was undoubtedly due in part to a considerable variation in the fertility of the soil. A part of this ten acre field devoted to oats was old land and in excellent condition. A few acres were newer land, not in as good tilth and not as well supplied with fertility. This illustrates very well the difficulty of getting results that can be properly compared when testing varieties on large plots of half an acre or more.

We report the yields as they occurred, but all the variation should not be attributed simply to difference in variety.

Seeding of oats began April 24th, just five days earlier than in 1915. The following table shows date of first seeding and soil temperatures for the past four years.

Date of first seeding of oats.		Soil temperature at depth of 3 inches.
1913	April 20th	52 deg. F.
1914	May 13th	45 deg. F,
1915	April 29th	39 " F.
1916	April 24th	45 " F.

Date of seeding wheat.

1915	April 22nd	36 deg. F.
1916	April 28th	42 " F.

For the past three years all the oats used for seed have been treated with formalin to destroy smut spores. This year this treatment was omitted as no smut had been found in our oats for two years. The omission seems to have been justified as no smut appeared this year, and the seed must therefore have been perfectly clean.

The following varieties were sown on land where mangels and turnips were grown the year before, and gave the yields indicated.

Variety	Size of Plot	Lbs. of Straw and Grain per Acre	Yield of Grain per Acre	Percent of Hull
Banner (Waugh Strain)	1 acre	6295	70 bus	25
Banner (Brown Strain)	1 "	4010	43 "	25
Ligowo	1 "	5900	57 "	24
Sandy	1 "	4390	42 "	22
Gold Rain	1 "	4060	36 "	26
Early Blossom	1 "	4970	46 "	28
White Wave	1 "	3870	28 "	30

As pointed out above the great variation in yield shown in this table cannot all be attributed to difference in variety. The first three varieties were on land of about equal value and can be properly compared. The soil on which the remaining four plots were grown was somewhat poorer than that of the first three. The Waugh strain of Banner oats that has been grown on the College Farm for a number of years gave a much heavier yield than any of the other plots. This variety has consistently held the yield for some years with the exception of 1915 when the Sandy oat gave a slightly higher yield due to the fact that the Waugh Banner lodged considerably that season.

The Ligowo keeps its usual high place coming in next to the Banner. This is a fine oat with a habit of growth very much like the Banner.

In the report on oats last year it was stated that the main oat field was not threshed and the yield could, therefore, not be reported. When that lot was threshed in January eight acres yielded 560 bushels, or 70 bushels per acre. At the present writing this year's field of seven acres is not threshed and the yield must be reported next year. It was cut on August 24th and when hauled to the barn gave a total weight of 29640 lbs., or 4230 lbs. per acre.

Oats on the marsh looked well when harvested, but have not yet been threshed.

Wheat.

As stated in previous reports this is not a wheat farm, and only small plots were sown this year. One half acre of Red Fife gave 6½ bushels or at the rate of 13 bushels per acre. One half acre of White Russian gave 10½ bushels or at the rate of 21 bushels per acre.

Seeding for Hay Crop.

Timothy and Red Clover seed were sown with oats and wheat on the upland and with oats on the marsh. The seeding on the upland was at the rate of 10 lbs. of timothy and 10 lbs. red clover per acre. We did not sow Alsike on the upland as it is not particularly suited to our light soil, and when the land is only in grass two years we do not need the perennial Alsike as much as we do on the marsh where hay is cut five or six years in succession.

On the marsh the seed consisted of 5 lbs. timothy, 3½ lbs. medium red clover and 5 lbs. of Alsike. In cutting the grass on the marsh this year from the same rate of seeding as that given above we found that it contained so much Alsike that it lodged badly. Alsike is a weak stemmed plant and not a heavy yielder and where it is very thick in the grass the whole crop falls down quite flat and is very hard to cut. Next year we plan to use less Alsike and more Red Clover to overcome this difficulty. Probably 7 lbs. Timothy, 5 lbs. Red Clover and 3 lbs. Alsike will make a better mixture.

Mixed Grain.

Four and a half acres were sown with a mixture of oats, barley, wheat and peas. This was on land that grew turnips in 1915, and no fertilizer was used this spring. The mixture used consisted of 1 bushel Banner oats, ½ bushel Duckbill Barley, ½ bus. Red Fife wheat and ½ bus. Canada field peas. This crop grew fairly well but suffered from dry weather in August and gave only a low yield. It was cut on August 21st and when threshed gave 121 bushels, or at the rate of 26.8 bushels per acre. This yield was very disappointing, although the grain secured made excellent feed when ground for cows. It would seem from our experience of the past two years that there is no advantage to be gained by sowing mixed grain on the College Farm, although the mixture grown in 1915 gave an average yield of 43.5 bushels per acre.

Mangels.

Mangels were grown on 3½ acres. Seed for 1½ acres was obtained from the Central Experimental Farm, Ottawa, and for one acre from McDonald College, Que. The remaining acre was sown with commercial seed obtained from local dealers, of which one lot was labeled "Sugar Mangels" and the other "Mammoth Long Red." This seed proved to be badly mixed in type when the roots were matured, although the yield obtained was good.

The yield for this acre of mixed seed was 925 bus.; for the acre and a half of Mammoth Long Red 1385 bushels. or 843 bushels per acre, and for the acre of Yellow Intermediate 1074 bus.

The first two plots received 500 lbs. per acre of Basic Slag and 500 lbs. of Acid Phosphate, the last plot 600 lbs. of each of the above fertilizers. This mixture was used because it happened to be the amount we had left on hand after the turnip experiment had been provided for. The land on which 1074 bus. of Yellow Intermediate were grown was a little heavier land, better suited to mangels than the other pieces where mangels were grown. This with the 200 lbs. of fertilizer extra may account for the larger yield. In 1915 three acres of mangels gave the following number of bushels pera cre:—

Plot No. 1	592 Bushels
" " 2	591 "
" " 3	434 "

Turnips.

Turnips were planted where grain was grown the year before. The land was plowed in the fall and given a medium dressing of barnyard manure during the fall and early winter, at the rate of from 15 to 20 tons per acre. This field was quite uniform as far as fertility and tilth was concerned, but 2½ acres of it had been used for experimental plots some years previous and where roots had been grown for a number of years we found a good deal of black rot and clob-root in this year's crop.

The following table shows varieties grown, fertilizer used and yield per acre:

Size of Plot	Variety	Fertilizer used per acre	Yield per Acre, Bus. 50 lbs. per bus.
No. 1-1 acre	Champion	1000 lbs. Basic Slag; 4 tons ground limestone	917
No. 2-1 acre	Champion & Magnum Bonum	1000 lbs. Basic Slag; 4 tons ground limestone	972
No. 3-¼ acre	Magnum Bonum	1000 lbs. Basic Slag; no limestone	987
No. 4-¼ acre	Champion	1000 lbs. Basic Slag; no limestone	965
No. 5-1 acre	Champion	1000 lbs. Acid Phosphate; 4 tons ground limestone	1104
No. 6-1 acre	Magnum Bonum	1000 lbs. Acid Phosphate; 4 tons ground limestone	1050
No. 7-¼ acre	Magnum Bonum	1000 lbs. Acid Phosphate; no lime	981
No. 8-¼ acre	Champion	1000 lbs. Acid Phosphate; no lime	930
No. 9-1 acre	Champion	500 lbs. Acid Phosphate; 500 lbs. Basic Slag; 4 tons limestone	914*
No. 10-1 "	Magnum Bonum	500 lbs. Acid Phosphate: 500 lbs. Basic Slag; 4 tons limestone	768*
No. 11-¼ "	Magnum Bonum	500 lbs. Acid Phosphate; 500 lbs. Basic Slag; No limestone	732*
No. 12-¼ "	Champion	500 lbs. Acid Phosphate; 500 lbs. Basic Slag; No. limestone	652*

*Yield required by club-root. See paragraph on club-root.

In preparing this field for turnips the Fall of 1915, eight acres were treated with ground limestone at the rate of 4 tons per acre. As will be seen by an examination of the table 2 acres were given a dressing of limestone and then half an acre was left as a check plot, then two acres more were limed, and another half acre left unlimed, and so on across the field of 10 acres. Seven and a half acres were seeded to turnips and 2½ to mangels. The only appreciable effect of the liming is on plots 5 and 6, where acid phosphate was used as a fertilizer. Here the yield was 1104 and 1050, against 930 and 981 respectively on the check plot 8 and 7. Magnum Bonum turnips gave 1050 with lime, 981 without and Champion gave 1104 with lime and 930 without, a gain of 174 bushels of turnips per acre. Lime in conjunction with slag did not give any increase over slag alone on plots 1 to 4.

The effect of lime with a mixture of slag and acid phosphate was not determined as that part of the field was affected with club-root, caused by the fact that for a number of years prior to 1915 it was used continuously as an experimental field for roots and became inoculated with this disease.

It has frequently been stated of late that treatment with lime will kill club-root, but that the lime should be applied some two years or more before the turnips are to be grown in order to give the lime time to destroy the disease.

We are not able to see much result in diminishing club-root from the application of the limestone last fall, which is in line with previous experiments. It should be noted, however, that the smallest yield, and the most harm from club-root occurred on plots 11 and 12 where no limestone was used.

Turnip Seed.

Only a few plants of two varieties, Bangholm, and Champion were planted for seed. The object was to raise enough seed for our own use, but not to attempt to raise any quantity for sale. We secured a small amount of very fine seed which will be used for our main crop next year.

White or Soft Turnips.

Several acres of white turnips were grown as usual. These were not on extra good land and did not yield as heavy as last year when we had as high as 40 tons of green feed, tops and roots, per acre. A large amount of succulent fall feed was secured, however, and was a great help in feeding the cattle the month of October when the pastures were practically done.

The varieties grown were Suttons Yellow Aberdeen, and Early Sheepfold. They were sown in drills the same as the main crop of Swedes, thinned and hoed and cultivated in the same way.

Rape.

About one acre of Rape was grown which did fairly well, but was not as luxuriant as usual. This plant requires rich soil and a moist season to do its best. Two varieties were grown, Dwarf Essex and the New Cabbage Leaf, the latter variety proving the most luxuriant grower and forming the most succulent crop. This crop was grown in drills the same as the turnips but was not thinned out to one plant in a place, but left practically continuous in the row.

Soiling Crops

Oats, peas and vetches were grown together and cut green to feed the cows during the latter part of July and August. The seeding was practically the same as for last year, 2½ bushels of oats, ¾ of a bushel of peas and ⅓ bus. common vetch. This mixture grew well and furnished excellent green feed for the calves and pigs. Pastures were good until soft turnips were ready for the cows and they were not fed any oats and peas this year. One acre sowed on good soil will furnish ten tons or more of green feed by the 1st of August. This amount will furnish 50 lbs. per day to 10 cows for 40 days. That would take so long to feed up the acre that some of it would get too ripe before it was cut. For that reason it would be better to sow only half an acre at one time where 10 cows are to be fed. Half an acre put in the last of April would be ready for use the middle of July, and another half put in the last of may would be ready early in August.

Silage Crops—Corn.

Corn was planted on 5 acres, using five different varieties. This land was in grass the year before and gave a heavy yield of hay. The stubble was manured in the fall and winter, and the manure and heavy growth of grass plowed down about the middle of May. This gave a large amount of organic matter to rot in June and July and helped to warm up the soil and thus give the corn a better chance to start.

The plant food set free from the rotting manure and grass furnished ideal food for the corn later in the summer. This with a good season for growing corn, owing to early moisture, and no frost until late in September, gave us the best crop we have had in the past four years. The varieties grown and the yields obtained are shown in the following table:

Variety	*Yield per acre.*
White Cap Yellow Dent	22890 lbs.
Longfellow	24110 "
Wisconsin No. 7	22300 "
Comptons Early	20210 "
Golden Glow	21200 "
Average yield per acre	11 tons.

Oats, Peas and Vetches.

(*O. P. V.*)

We reported the results of growing O. P. V. for silage in 1914 and in 1915. This year we again grew 5 acres of this mixture. The yield was not as large as in the two previous years, and was no doubt partly due to dry weather in July and August. The seed was sown on April 26th. and harvested from August 8th to 17th.

The last acre cut was getting almost too ripe, and owing to a break in the ensilage cutter the O. P. V. was left in cock for several days of hot dry weather. This reduced the weight considerable, and made the yield appear lower than it really was. The first three acres gave 8¾ tons per acre, and total yield from the five acres was 37½ tons. The last acre when cut into the silo was too dry to pack well, and a large amount of water was run on top through a hose after each load was cut. This made it wet and heavy and after much tramping it settled well and kept all right.

Hay.

Haying began on July 10th, and the crop proved to be excellent. The yield on the upland and on the marsh was fully up to that of last year, which was very heavy. The total yield from 10 acres on field No. 1 (directly east of the poultry plant) was 70,700 lbs. or over 3½ tons per acre.

The yield on 8 acres of new seeding in the Frizzle Field was approximately 3.8 tons per acre as will be seen from a study of the test plots treated with limestone as given on page 91 of this report. The yield on the marsh was an average of somewhat over three tons per acre.

Alfalfa.

The piece of Alfalfa described in my reports for 1914 and 1915 did not show up well this year. Although there was a good deal of Alfalfa in the piece it was overgrown with grasses which seemed to have crowded it out. After the first cutting early in July the Alfalfa came up quickly and made the plot look much better than it did early in the season. If the grasses crowd in as strongly again next spring there will not be much of the Alfalfa left. This seems to be one of the difficulties experienced quite commonly in this country in trying to grow this crop. Our moist climate is so well suited to the growth of grasses that they are able to crowd out any stranger.

Fertilizers.

The most of the commercial fertilizer used was on the mangels and turnips, and the result of its use has been tabulated in the report on those crops. Sydney Basic Slag gave good results on turnips and the mixture of Slag and Acid Phosphate gave a good crop of mangels. Acid Phosphate in conjunction with ground limestone gave the largest yield of turnips.

Five hundred pounds per acre of Basic Slag was used on the marsh where oats and grass seed were sown. This treatment has given us splendid results in previous years, and the clover seeding was in excellent condition last fall after the oats were cut.

Use of Ground Limestone.

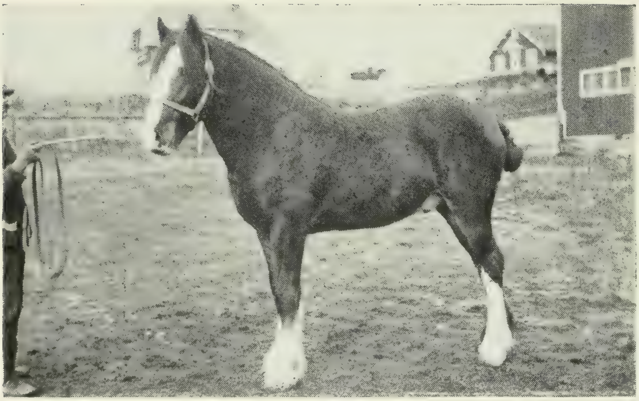
In my report for 1915 a table was given showing excellent results in the growth of clover from the use of ground limestone on some plots, while others gave no increase whatever. The following table shows the amount of hay obtained on these plots for the two years 1915 and 1916. The 1915 column is a copy from last year's report:—

No. of Plot			Lbs. Cured Hay		Tons Per Acre	
			1915	1916	1915	1916
1	1 acre	½ unlimed.	2550	3150	2.5	3.1
		½ limed.	3610	2860	3.6	2.8
2	1 "	½ unlimed.	2570	2880	2.6	2.8
		½ limed.	3090	2640	3.2	2.6
3	½ "	½ unlimed.	1160	1500	2.3	3.0
		½ limed.	1490	1510	3.0	3.0
4	½ "	½ unlimed.	1150	1610	2.3	3.2
		½ limed.	2010	1910	4.0	3.8
5	½ "	½ unlimed.	3650	2280	3.6	4.5
		½ limed.		2200		4.4
6	½ "	½ unlimed.	3050	1950	3.1	3.9
		½ limed.		2000		4.0

A study of this table shows that the yields were very much more uniform in 1916 than in 1915. On only one plot, No. 4, was there more hay on the limed half this year as well as last year. This plot gave the greatest advantage to lime last year, and the effect seems to be continued to this year. In the 1915 report it was stated that it would be interesting to note how much the lime increased the yield the second year. From the figures given in the table we find that there was practically no advantage the second year from the lime application on this land, which is not proof, however, that there would be no advantage the second year on any soil.

The use of lime was continued on the oat field in 1915 and the plots were in hay for the first cutting this year. This set of plots was located in what is known as the Frizzle field. This field was in excellent tilth, it furnished a good yield of turnips in 1914, a heavy crop of oats in 1915, and a heavy crop of hay the present year. The whole field was in much the same condition as Plots No. 5 and 6 of last year's experiment. That is, it was in such good "heart" that it grew a heavy crop of hay regardless of whether or not it was treated with lime.

The following table shows the yield of the 5 plots in the experiments which were in Field No. 6 (Frizzle Field).



College Baron No. 16631.

Clydesdale Colt, 2 years old, owned by Nova Scotia Agricultural College.

This colt will be 3 years old the summer of 1917. He is a well built, quick stepping, fine looking colt. He is not over large, and will make an excellent stallion for use in places where action and toughness are wanted rather than extreme size.

No. of Plot	SIZE	Yield of Cured Hay	Yiele Per Acre in Tons
1	½ acre limed..............	3850	3.8
2	½ " unlimed...........	3950	3.9
3	½ " limed.............	3550	3.6
4	½ " unlimed...........	3850	3.8
5	½ " limed.............	3970	3.9

It will be seen by these figures that the limed plots averaged slightly less than unlimed, but not enough difference to signify anything for or against the lime. The limed plots contained by far the best growth of clover, however, although the total yield did not exceed the unlimed. The timothy was heavier on the unlimed plots, not having been so much crowded out by the clover.

In addition to the use of lime on the hay field, an experiment was started in the turnip field for 1916. In the fall of 1915, after the field intended for turnips in 1916 had been plowed, it was treated with lime at the rate of something over 4 tons per acre. This 10 acre field was divided into four two acre plots and four and a half acre plots alternately. The two acre plots were limed and the half acres left without as check plots. The effect of the lime on the crop of turnips was discussed on page 86 of this report. By a study of the table giving the yield of turnips on page 85 it will be seen that the only real advantage that can be claimed for the lime was on plots 5 and 6 where it was used in conjunction with acid phosphate and on plots 9 and 10 where it seems to have reduced the loss from club root. On plot 5 and 6 the yield of turnips with lime and acid phosphate was materially larger than on the check plots where acid phosphate was used alone. This field will be watched with interest next year when in grain and also the following year when it will be in hay.

Live Stock.

The live stock on the farm at the present time Nov. 1st 1916, consists of 27 horses, 97 cattle and 23 swine.

Horses

Lord Ullin the imported Clydesdale has completed his third season at the College barn. He was six years old last May and is in his usual good health and condition.

The young Clydesdale stallion Royal Thomas, by Royal Baron, has developed into a good horse, and did a fair season's work. He possesses the fine "top" of his sire and is quite a showy colt.

The Standard bred stallion Achille, and the Hackney Cliffe Rosador are in excellent condition but were only bred to a few mares during the season.

The two year old Clydesdale colt College Baron is developing into a good horse and will make an excellent stallion for some part of the country where compactness, action, and quality are wanted rather than extreme size.

The remaining pure bred Clydesdales on the farm are the same mares that were reported last year, three imported and four home bred. The two year old Clyde filly College Jean, from College Bell, and sired by Royal Baron, is growing well and will make a useful mare. The two sucking colts reported last year, one from Barbara and one from Miss Time, have both grown well and are in good condition. Four colts were born last spring, two of which died at birth, apparently from failure of the valves of the heart to close properly.

One of the two living is from Eunice Flash, a daughter of Flash Favorite, and the other from Rosaline Royal a daughter of Royal Baron, and both are sired by Lord Ullin.

The remaining horses on the Farm are:—

I Standard Bred mare, Lillian Allerton.
1 Hackney Mare, Queen Louise.
1 Hackney Gelding, Rosador Performer.
1 Cross bred mare.
1 Cross bred yearling.
1 Clyde Gelding—3 years old.
6 Grade work horses.

Cattle.

The Bang system of handling cattle that have reacted to the tuberculin test is still in force. The number of "reactors" left in the quarantine barn Nov. 1st 1916 is fourteen. Ten have been killed during the year because they had become useless as breeders. Some of them were in perfect health as far as physical examination could determine, but when slaughtered were found to contain some slight lesions of the disease. Others were badly affected and showed it in their appearance. No reactions were obtained during the past year in the barn where the non-reacting cattle are

College Canary Rosie, No. 28082.

Holstein Heifer, 3 years old, owned by N. S. Agr. College. This heifer is a daughter of Artis Rosie No. 9808 whose picture was printed in last years report, and which gave 16737.6 lbs. of milk and 752.25 lbs. of butter in one year. Altho this heifer does not show a larger udder, she is doing extremely well as she calved when under three years old and has given in one day 65 lbs. and up the first 3½ months of her work as a dairy cow over 6000 lbs. of milk.

Mechthilde De Pride No. 15069.

Holstein cow, 7 years old, owned by N. S. Agr. College. This cow produced last year 12,082 lbs. of milk and 498 lbs. of butter. This year (1917) she freshened in January and during the month of February has given as high as 93.6 lbs. and 4.3 lbs. of butter in one day. In seven consecutive days in February she gave 638.9 lbs. of milk and 28 lbs. of butter, an average of 4 lbs. per day.

kept. This result is especially gratifying since a large number of calves were brought immediately after birth from the quarantine barn to the barn where the non-reactors are kept. We can, therefore, affirm more confidently now than we did last year that "all indications point to a speedy clearing out of reactors from the entire herd."

The following is a brief description of the cattle on the farm at the present time Nov. 1st 1916.

Total number 97; non-reactors 83, reactors 14.

Holsteins; Number 39.

No Holsteins were bought during the year. A number of young bulls were sold, and a few females were slaughtered. The bull at the head of the herd is Colony Canary Rag Apple the same animal described in last year's report. He is in fine condition and has proved a very sure stock getter. His first calves are beginning to arrive this fall and are showing up strong and well proportioned.

During the year seven young bulls were sold to Agricultural Societies and to private breeders.

The present herd consists of the stock bull described above, one yearling bull, 6 male calves, 4 female calves, 8 yearling heifers, 3 two year old heifers and 16 cows.

Ayreshires; Number 40.

No Ayreshire females were bought during the year. Five young bulls were sold for breeders and a few females that had ceased to be useful as breeders were slaughtered.

A half interest was bought in an Ayrshire bull, Jean Armours Lotus Laddie, imported from Vermont by Mr. Prescott Blanchard of Truro. This bull comes from a famous milking family. His dam Jean Armour was the first Ayrshire cow to give 20,000 lbs. of milk in one year. Her daughter Jean Armour 3rd, as a senior three year old in an official test produced in one year 21,938 lbs. of milk containing 849.18 lbs. of butter fat, equal to over 1000 lbs. of butter, and holds the world's record for Ayrshire cows of that age. Another daughter, Lotus Jean Armour commenced her junior three year old record last June and gave in July 1606 lbs. of milk and in August 1653 lbs. testing about 3.64 % of fat.

The young bull Jean Armours Lotis Laddie carries 75% of the blood of Jean Armour, as his sire is also a son of this great producing cow. Although this is close inbreeding, it has often resulted in producing a prepotent animal of wonderful power. We consider ourselves fortunate in obtaining a half interest in this young sire, and hope that he may add greatly to the milking qualities of our Ayrshire herd.

The bull Gardrum Jim reported as head of the herd last year is still holding that position. He has developed into an excellent individual and his calves are of good conformation. His dam Gardrum Bonnie Jean produced nearly 12000 lbs. of milk last year and this year has done much better in the first six months of her lactation period than last year, having produced in that time over 10000 lbs. of milk.

Scottie's White Floss, a large Ayrshire cow of excellent dairy type produced 12,529 lbs. of milk testing 3.94 and containing fat equal to 618.56 lbs. of butter. One two year old heifer, Gardrum Annie Laurie has given in the last eleven months 9,345.7 lbs. of milk, and a three year old, Hillside Miss Pan, gave 8,737.3 in the same time.

The Ayrshire herd consists of the herd bull Gardrum Jim, seventeen cows, four two year old heifers, six yearling heifers and four heifer calves, four yearling bulls and four bull calves.

Shorthorns—Number 18.

Golden Ben, the bull described last year is still at the head of the Shorthorn herd. He is in good condition and is developing well. On account of the loss of our herd bull in 1915 we failed in getting some of the cows and heifers in calf that fall, and on that account no increase is reported this year in the number of Shorthorns. Five heifers ranging in age from three years to three years and eight months are due to calve within a few weeks. The herd at present consists of the stock bull, Golden Ben, 4 cows, 7 heifers, 3 young bulls, and 3 bull calves.

Milk Production.

The following table shows the work done by the cows in the herd during the past year.

Gardrum Bonnie Jean (imp.) No. 33498.

Ayrshire cow, seven years old, owned by N. S. Agr. College. This picture was taken in the pasture and shows Bonnie Jean ordinary working condition. She gave last year 11,817 lbs. of milk, and 571 lbs. of butter. In the first 6 months of her present lactation period she has given over 10000 lbs. of milk, and averaged over 60 lbs. daily for 3 months.

Eastcourt Merrymaid No. 37542.

Ayrshire cow 6 years old, owned by N. S. Agr. College. Last year she produced 9,771 lbs. of milk and 508 lbs. of butter in 8½ months and gave birth to twins 10½ months after previous calving. Her best yield for one day thus far during her present lactation period was 74½ lbs. of milk and 4 lbs. of butter. She has given birth to 5 calves (twins once) in less than three years.

Name	Breed	Age	Days in milk	Best Year's Record		% fat	Date of Freshening freshening	Sex of calf	Lbs. Milk from freshening to Nov. 1/16.	Remarks
				Lbs. milk	Lbs. butter					
Maple Grove Louise De Kol	Holstein	15	291	11,226.5	522.21	3.72	May 3-16	Male	6,921.3	
Victoria Calamity Clay	"	11	365	22,835.0	803.41	2.81	Jan. 18-15	Male	31,986.5	
Jemima Wayne Sarcastic	"	11	365	14,336.4	560.44	3.13	Mar. 18-16	Female	10,153.2	Still-born.
Artis Rosie	"	9	350	16,318.0	751.25	3.78	Oct. 2-16	Male	2,111.4	
College Flora	"	8	341	10,587.5	416.92	3.14	July 23-16	Male	4,198.7	
Emma of Evergreen 2nd	"	8	365	16,737.6	654.03	3.13	Oct. 18-16	Female	633.0	
Cobequid Rooker La Honda	"	8	365	13,713.6	613.74	3.58	Oct. 29-16	Male		
Mechthilde de Pride	"	6	365	12,082.3	498.30	3.29	Feb. 1-16	Female	12,005.6	
Victoria Pauline Clay	"	6	365	11,568.2	548.90	3.79	Oct. 3-13	Male	14,421.4	
Miss Mina Rooker	"	5	293	10,034.8	396.71	3.16	Oct. 26-15	Male	10.034,8	
Flora Rooker Posch	"	5	365	15,599.0	619.69	3.18	Oct. 16-16	Male	1,020.1	
Tidy Posch De Kol	"	5	365	11,697.6	497.39	3.41	Mar. 27-15	Female	15,973.8	
Ida Rooker 4th	"	5	365	11,599.7	515.34	3.56	Apr. 15-16	Female	9,044.9	
Lady Mercena Mechlin	"	4	243	8,225.8	345.47	3.36	Dec. 20-15	Female	8,225.8	
Flora Wayne Posch	"	2	273	6,198.8	219.89	3.55	Dec. 31-15	Male	6,198.8	Died at birth
College Flora Wayne	"	2					Sept. 11-16	Male	2,543.6	First calf.
Gardrum Brandy 2nd	Ayrshire	9	322	8,207.0	384.83	3.75	Dec. 31-15	Twins	5,408.2	Male and Female
Scotties White Floss	"	9	321	12,529.6	618.56	3.94	Nov. 15-15	Female	12,529.6	
White Bessie	"	8	365	10,634.7	510.40	3.84	Apr. 25-16	Male	6,969.5	Calf deform., killed
Craig 2nd. of St. Anne's	"	7	287	8,526.5	449.96	4.20	Aug. 9-16	Female	4,133.7	
Gardrum Bonnie Jean	"	7	330	11,817.8	571.15	3.90	Aug. 7-16	Male	5,008.1	
Miss Doris	"	6	317	9,550.1	467.54	3.97	June 3-16	Female	5,939.7	
East Court Merry Maid	"	5	317	9,771.0	508.26	4.16	Feb. 16-16	Male	8,755.2	
Princess Laurie	"	5	296	5,857.6	273.72	3.73	Dec. 9-15	Male	5,857.6	
Hillside Bright Smile	"	5	313	8,428.9	395.16	3.75	Sept. 15-16	Female	1,887.2	
Jessie 2nd	"	5	336	7,072.1	349.70	3.95	Mar. 14-16	Female	5,134.2	
Princess Beatrice	"	5	365	8,761.4	396.87	3.60	May 4-16	Female	6,732.9	
Lady Mac. 2nd	"	3	184	3,782.9	196.97	4.16	Apr. 29-16	Male	3,782.9	
Hillside Miss Pan	"	3	314	8,737.3	484.67	4.43	Dec. 21-15	Female	8,737.3	First calf
Miss Craig of Truro	"	3	311	6,635.6	389.11	4.69	Dec. 15-15	Male	6.635,6	" Died at birth
Harelaw Cherry 5th	"	2	346	7,185.5	298.59	4.18	Nov. 19-15	Male	6,994.1	"
Gardrum Annie Laurie	"	2	305	9,345.7	419.71	3.59	Dec. 30-15	Male	9,345.7	"
MacGregor's Laurie May	"	2					Sept. 6-16	Male	2,364.3	"
College Evangeline 14th	Shorthorn	4	245	4,811.2	240.57	4.00	Sept. 1-16	Male	1,824.6	"
College Evangeline 15th	"	4	147	2,433.9	110.34	3.23	Sept. 14-16	Male	1,032.4	
Rosalind 2nd	"	3	186	2,388.0	129.71	4.34	Dec. 1-15	Male	2,388.0	

The cost of feeding the cows was about the same in 1916 as in 1915, due to the fact that we bought most of the mill feeds for the year during the early fall of 1915. In the annual report for last year a table was given showing the cost of feeding Eastcourt Merrymaid an Ayrshire cow that produced 8, 127 lbs. of milk and 421 lbs. of butter. The following table showing the cost of feeding Scottie's White Floss the past year compares favorably with that given for Eastcourt Merrymaid in 1915, which was $76.83.

Cost of feeding Scottie's White Floss.

Nov. 1, 1915 to Nov. 1, 1916.

*Grain mixture	3208 lbs.	@	$30.00	Per ton	$48.12
Turnips	151 bus.	@	8c	" bus.	12.08
Silage (O. P. V.)	1575 lbs.	@	3.00	" ton	2.36
" (Corn)	2280 "	@	4.00	" "	4.56
Hay	2430 "	@	12.00	" "	14.58
Rape & White turnips	2300 "	@	1.50	" "	1.72
Pasture, 4 months		@	1.50	" M.	6.00
					$89.42

The cost of feeding this cow is extremely low for one producing 12000 lbs. of milk. On looking up her daily feed record I find that she did her best work on 12 lbs. of grain per day. When fed more grain she did not give any increase in milk, and for three months of her lactation period she was fed on pasture alone with no grain whatever. This shows her to be an exceptionally economical producer. The milk produced by this cow if sold to the Borden Condensed Milk Co. in Truro at $1.60 per hundred would have brought the sum of $200.46. If it had been made into cream and sold to a creamery at 32c per pound for butter fat the account would stand as follows:—

12,529 lbs. of milk testing $3.94.

493.64 lbs. fat at 32c.	$157.96
10,023 lbs. of skim milk at 30c per cwt.	30.06
	$188.02

These figures show that a cow giving 12000 lbs. of nearly 4% milk is a profitable animal to keep. The cost of feed was only a little less than $60.00 for the year, leaving a balance of almost $100.00 to pay for labor, interest, depreciation,

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*Grain mixture was made up of 3 lbs. wheat bran, 2 lbs. gluten feed, 1 lb. cotton seed meal, 1 lb. oil meal, and 1 lb. wheat middlings.

barn rent, etc. These items would not total more than $50.00 so that a net profit of some $50.00 or more is left.

If cows of this kind were the rule instead of the exception the dairyman would have a money making business at present prices. It is not possible, however, to get all the cows of the country to average even half this amount. A study of the yearly production table of the College herd will show that some of the cows have produced less than 6000 lbs. in one lactation period. This would bring them rather below the line of profit. Such cows might pay for the feed and labor put on them but there would certainly be no net profit. Of course their feed bill is much less than that for the cow that produces heavily. Unfortunately it is impossible to bring every cow up to a high standard, and for that reason the business of dairying is not as profitable as it would appear to be from the study of such cows as Scottie's White Floss.

Swine; Number 23.

The two breeds of swine kept for some years past are Yorkshire and Berkshire. At present (Nov. 1st.) our stock consists of the following animals:—

1 mature Yorkshire Boar
5 " " Sows
4 young " "
2 mature Berkshire Boars
4 " " Sows
1 cross bred York, Berk. sow
6 feeders, 3 York. and 3 Berks, two months old.

During the year we raised nine Yorkshire litters with an average of practically ten per litter, which is one less than the average reported for last year. The Berkshires this year gave us seven litters with an average of seven per litter, against an average of eight for the year before.

The stock Yorkshire boar is the same one reported for last year, Rosevale John 52nd. He is a very large boar and is getting fine stock. We have recently purchased from McDonald College, Que. a very fine Berkshire Boar that we hope will greatly improve our stock of that breed.

Most of the pigs farrowed during the year were sold for breeding purposes to farmers all over the Province. Six from the Fall litters, 3 Yorks and 3 Berks were kept for feeding purposes. This feeding is done partly as an experiment and partly to demonstrate to students the cost of feeding well bred pigs, and the rate at which they will gain.

Since writing the above a number of weeks have elapsed and in the meantime these six pigs have been butchered. The following table shows what they were fed and the gains they made, as well as the cost of feed, and amount received for pork.

3 Yorkshire Pigs—23 weeks old when butchered,

Feed Eaten.

396 lbs. of wheat middlings at $1.60 per cwt	$ 6.33
451 lbs. mixed grain, home grown, at $2.00 per cwt.	6.33
15 bus. Mangels at 12c per bus	1.80
4800 lbs. skim milk at 25c. per cwt	12.00
Cost of feed	$29.15
Value of pigs at 5 weeks old	12.00
	$41.15

Live weight when butchered	652 lbs.
Dressed weight when butchered	476 "

Proportion of dressed carcass to live weight 73%.

476 lbs. pork at 17c	$80.92
Cost of pigs as above	41.15
Returns above cost of feed	$39.77

3 Berkshires—23 weeks old when butchered. Feed eaten.

361 lbs. of Middlings at $1.60	5.77
403 lbs. of mixed grain (home grown) at $2.00	8.06
10 bus. mangels at 12c per bus	1.20
4800 lbs. of skimmed milk at 25c per cwt	12.00
Cost of feed	$27.03
Value of pigs at 5 weeks old	12.00
Total cost	39.03

Live weight when butchered	587 lbs.
Dressed weight when butchered	461 lbs.

Proportion of dressed carcass to live weight 79%.

461 lb. of pork at 17c	$78.37
Cost of pigs as above	39.03
Returns above cost of feed	$39.34

A comparison of the two lots shows that they practically gave the same net profit. The Yorkshires ate $2.12 worth of feed more than the Berkshires, and produced $2.55 worth more of pork.

It is a very common belief among farmers that Berkshires will develop more quickly and produce more economical gains during the first six months than Yorkshires. In this case it will be noted that the Yorkshires made the greater gains, and at a slightly less cost. A study of the following table will show that the Yorkshires led right from the start:—

		Yorkshires	Berkshires
Weight of 3 pigs	Nov. 14–16	276	260
" "	" 28	341	316
" "	Dec. 12	419	379
" "	" 26	503	455
" "	Jan. 8	582	526
" "	" 29	652	587

The weights given for Jan. 29th are the weights at time of butchering.

Although the Yorkshires weighed 65 lbs. more when alive than the Berkshires, their dressed carcasses only weighed 15 lbs. more. In other words, the per cent of dressed carcass to live weight was greater in the case of the Berkshires.

The total gains in both lots were quite large and probably would not have been obtained if unimproved stock had been used. These pigs were all of our own breeding and were high class in every way. Furthermore they were kept in a light, dry swine barn where conditions were all favorable for good growth. Pigs kept in dark, wet dirty pens without exercise would not do as well, especially in winter. The results of this feeding trial do not prove that Yorkshires are better than Berkshires, but show that well bred specimens of these breeds will make somewhere near equal gains when under the same conditions. The price allowed for skim milk is only conventional. If we figured the profit made as the money we received for skim milk, as a creamery man might, it would make it worth over $1.00 per hundred. The total cost of the pork in both lots, less the skim milk, was $56.18. The total returns were $159.29, leaving a balance of $103.11 to pay for 9600 lbs. of skim milk. These figures are extremely high, however, and are only obtained because the exceptional price of 17c per pound was obtained for the pork.

I may say in conclusion that the work of the year has been quite satisfactory. The work has been kept up to date in spite of the difficulty of getting help under present conditions. Mr. Hooper as Farm Foreman and Mr. Retson, as Herdsman have done efficient work as usual.

Mr. S. J. Moore of the Dominion Seed Department took an interest in the crops and furnished us with varieties of corn for seed that materially added to the yield of silage corn, and to the interest of the work with that crop.

Mr. Sweeney who had charge of the work in the farm dairy last year left us in April to take charge of the new creamery in the Margaree Valley and he was succeeded by Mr. K. F. Redding who graduated from the College last Spring. He has done his work during the summer in an obliging and efficient manner.

H. L. Trueman, who began work last year as an assistant in the Department has continued his work throughout the year, and has kept the records of the animals and of experimental work with neatness and accuracy.

Respectfully submitted.

JOHN M. TRUEMAN.

PART 6—POULTRY DEPARTMENT.

Prof. M. Cumming,
Secretary for Agriculture.
Truro, N. S.

Sir —I have the honor to submit herewith my 15th annual report as Manager of the Poultry Department.

The interest in Poultry Husbandry has been a source of inspiration and satisfaction to any person who has to do with this work in the Province. The clubs organized under authority of the act to encourage Poultry breeding passed in May, 1913 have all made satisfactory progress. Shows have been held by each club which with few exceptions have far exceeded all previous efforts in both quality and quantity of the exhibits. Two new clubs were formed during the year in counties which have heretofore shown only very little active interest in the work. They both purpose holding initial shows during this winter.

The egg circle at Pugwash Junction collected from its members 7,000 dozen eggs which were marketed in a satisfactory manner to all concerned. A new feature of the work of this circle and one which it is my intention to assist, is the collecting of the eggs during the season of large production and storing them properly until such time as the market improves and prices become more satisfactory to the producer. The method is simple and requires only good care in collecting the eggs and providing proper storage for them. Several different methods are in use for this purpose namely, cold storage, lime water and water glass (sodium silcate) and of these three the later method was selected. A cement tank was built in the house cellar of the manager of the circle and the solution was prepared and placed in this tank. All eggs were candled and the utmost care was taken that no eggs not perfectly fresh were placed in the solution. All eggs must be covered by the solution at all times. The eggs were collected during April, May and June and were sold in November. This proved satisfactory to the purchaser and the farmers netted about 10 cts. per dozen more for their spring eggs. At first glance, one might be led to believe that this system if organized largely, would result in the price of eggs becoming very high. Any one who has a knowledge of the perishable nature of an egg can readily appreciate the decided advantage of placing eggs as soon as possible in some place where they will not deteriorate. During the months of April, May and June, eggs reach a very low price and dealers do not wish to have a large stock on hand for fear of loss and farmers have very good reason to fear the risk of shipping in hot freight cars any distance. It is therefore a pleasure for me to be able to suggest to egg circles and farmers a method which from personal experience in this Province has proven so successful. A word of caution would not be amiss. None but strictly fresh eggs should be placed in the tanks and every care should be taken to handle the eggs quickly when it is necessary to move them during hot weather. The candling should be under the care and direction of an expert so that all eggs not of prime quality may be used otherwise than for storage. The eggs which were handled this season by Mr. William McLeod for the Pugwash Jct. Circle have proven satisfactory, and no small amount of credit is due to Mr. McLeod for his great care and attention to the work of this circle. He has demonstrated that co-operative marketing of eggs is a good thing for the farmer and is also a means of helping to provide a more even supply of this product to our consumers in this Province. I have had an expert opinion on these eggs after eight months in storage and actions speak louder than words, this same expert placed an order for ten thousand dozen of these eggs for next year's delivery.

Demonstration Houses.

Three Demonstration houses have been erected at the following places, Sherbrooke, Guysboro Co, by Mr. R. J. Scott; at Boylston, Guysboro Co., by Mr. Fred Atwater; Port Royal, Richmond Co., by Mr. Alfred Forgeron.

Applications had been received for the erection of several other houses but owing to the cost of labor and material the applicants did not wish to undertake the work this year.

It is now several years since the first of these houses was built and as stated in previous reports, I had evidence that the erection of these houses was assisting in interesting people in poultry keeping. Last year one of these houses was erected at Mount Denison by Mrs. James Stoddard and it is a pleasure for me to include in this report just as received from Mrs. Stoddard her report of last year's results with the poultry. It is not submitted for the purpose of showing how much can be made from a flock, but rather to show what method to follow in keeping records of the flock.

Report of expenses and receipts for 140 hens kept by Mrs Jas. Stoddard, Mount Denison, Hants Co., N. S., from December 1st, 1915 to December 1st, 1916. These hens were Barred Plymouth Rocks.

Dr.

To	40 yearling hens at $1.00	$ 40.00	
“	100 pullets at $1.00	100.00	
“	4 Roosters	14.60	
			$154.60

Stock on hand.

“	170 bus. oats at 60c	$102.00	
“	13 bus. wheat at $1.25	16.25	
“	mill feed	169.00	
“	1 bag rolled oats	3.25	
“	2 bags beef scrap	6.00	
“	20 bus. turnips at 20c	4.00	
“	10 bus. turnips at 25c	2.50	
“	Feed		$303.00
“	2 bbl. of oyster shells at 75c	$ 1.50	
“	500 lbs. straw	2.00	
“	Lime for cleaning	1.00	
“	Oil for incubator	5.44	
“	Coal for brooder house	3.00	
“	Water glass	5.00	
“	Insect powder	.25	
“	Freight on return of cases	2.40	
“	Rent of land	35.00	
	Necessaries		55.59
			$513 19

Cr.

By	1152 doz. fresh eggs at 35c	$403.20	
“	675 doz. preserved eggs at 40c	270.00	
“	eggs for settings	7.00	
			$ 680.20
“	600 baby chicks at 12c	72.00	
“	80 prs. broilers at 75c	60.00	
“	48 lb. dressed chicken atb25c	12.00	
“	125 lbs. fowls at 20c	25.00	
“	16 pullets late at 50c	8.00	
“	70 bbls. droppings at 50c	35.00	
			$ 212.00

By	90 yearling barred rock hens	90.00	
"	120 pullets barred rock	120.00	
"	25 male birds 2 years	10.00	
"	2 male birds, yearlings	4.60	
"	5 cockerels at $2.00	10.00	
			234.60
			$1126.80

Profit in cash	$533.61
Profit in increase in stock	80.00
Total Profit	$613.61

The Demonstration House which we exhibited at the Provincial Exhibition at Halifax last year was taken to the exhibition at Sydney this year. This house was visited by many persons and plans were supplied to all who required them. It is our intention to exhibit this house at the Yar.-mouth exhibition next fall. We expect afterward to erect it on our plant in a permanent manner. It is now in use as a temporary shelter for chickens during summer and fall.

Meetings Attended.

During last year I addressed thirty-five meetings in the counties of Guysboro, Richmond, Queens, and Annapolis and held a few other meetings in different other counties of the Province besides. In arranging meetings I have found it much more satisfactory to spend a week or ten days holding a series of meetings and during the day to visit farms and assist in planning poultry houses, or other work required when not travelling from one place of meeting to another.

County Poultry Clubs.

Richmond County Poultry Club held their first show January 17-18 and it proved to be a decided success. A number of very creditable exhibits were shown but the the attention of all should be given to preparing the poultry for show purposes.

The officers are as follows:

President, Jas. D. Power, Sheriff.
Secty.-Treas., Rev. G. A. Andrew.

The King's County Poultry Club held their fourth annual show January 17-18-19. This was a very much larger show than the one held the previous year and showed excellent quality in every class.

This club also held this season's show on December 19-20-21. All classes were well filled and an exhibit from the Dominion Department of Agriculture of an educational nature was very much appreciated by the management. This exhibit is a good one and I hope to be in position to secure it for our other Poultry Clubs during the coming season.

The officers of this club are:—

Hon. President, Prof. W. S. Blair, Kentville, N. S.
President, Ernest Craze, Port Williams.
Vice-President, E. J. Armstrong, Port Williams.
Secretary-Treasurer, Warden Plant, Kentville.
Assistant, Secty-Treasurer, E. H. Dodge, Kentville.

The Yarmouth County Poultry Club held a show in connection with the Short Course on February 8-9. This proved to be a very successful show but for some unexplained reason the general public of the town do not give this worthy effort any support. Some very good poultry are kept in the county and a little attention from farmers to improving their stock by using some of this stock would result in great improvement in this county.

The officers are as follows:—

President, C. W. Cook.
Secty., G. M. Pettet, Yarmouth.

The Lunenburg County Poultry Club held a good show of poultry at the same time as the Short Course was conducted, Feb. 21-22. Where space of building permits to hold short course and Poultry Show combined it makes a very good combination. It would however have been a decided advantage if this show were held earlier in the season and held in the town instead of at exhibition buildings which are some distance from the town.

The officers of this Club are:—

President, Owen G. Dauphinee,
Secty., James Bailey, Bridgewater.

The Egerton Poultry and Pet Stock Association of Pictou Co., held their eighth annual show of poultry at New Glasgow on November 15, 16-17. This show was not up to the usual standard of quality and quantity. It is very difficult to give a good reason for this decline. It may be that the attention of a great many of the poultry men of the past is now taken up fully in pursuit of other and more urgent employment in the munition plants. There was however some very fine specimens shown and the Club has no reason to be in the least discouraged, if in these war times some of their number should not find time to exhibit. The show was conducted in an ideal manner by the officers.

The officers are:—

President, Geo. Cavanagh.
Vice-President, D. L. McAulay.
Secty., E. E. Frehill, New Glasgow.
Treasurer, S. Eastwood.

The Glace Bay and District Poultry and Pet Stock Association held their fourth annual show at Glace Bay on November 24-25-26, in Alexander rink. This was the best show yet held by this club and on one evening the show was visited by over 1200 people. The exhibits were very numerous and of a very superior quality. This club keeps up a continued series of meetings during the year and by this means the members are able when the show time comes around to be in a position to handle their stock properly and to put it into the show in perfect condition.

The officers of this club are:—

President, William McKinnon.
Vice President, Carl Hoare.
Secretary, D. N. Brodie, Glace Bay.
Treasurer, M. W. Buchannan.

The Antigonish County Poultry Club held their fourth annual show on December 1-2. This show has shown a great deal of improvement in the last three years over the first one held four years ago. The quality of the poultry has very much improved and a great deal more interest is shown in keeping better poultry and keeping poultry better, as a result of the show. Friends of the cause have donated several very handsome silver cups for competition which keeps the interest at fever heat about show time and has also been indirectly the cause of importations of some very fine stock from the United States breeders of good repute.

The officers of this Club are:—

President, Wm. Simpson.
Vice President, A. A. G. Stronach.
Secty-Treas., Thos. F. McDonald, Antigonish.

On November 8th a number of the poultry breeders of Halifax city and county gathered at the Birchdale and organized a Poultry Club for the district. They hold meetings regularly during winter months and work for the best interests of the industry. Dates have been selected for the holding of a show in February and if the energy displayed is any sign, the officers will make a success of this their initial show.

The officers are:—

President, E. S. Tracey.
Vice President, Robert Carter.
Secty.-Treas., C. F. Bowes, Halifax, N. S.

During the holding of a short course at Lawrencetown, the poultry men in attendance decided to organize into an Annapolis County Poultry Club. A show is to be held in February of this year which already gives promise of being a large and successful one.

The officers are:—

President, Fred E. Bath.
Secty.-Treas., E. C. Shaffner, Lawrencetown.

The Victoria County Poultry Club has already selected dates for the holding of their show at Baddeck which gives promise of being a larger and better one than their first effort last year.

The officers are:—

President, F. J. McFarlane.
Secty-Treas., Douglas Fraser, Baddeck.

The Hants County Poultry Club is in a fair way to again hold a re-organization meeting and if any support is forthcoming a show may be held during this winter.

The farmers and poultrymen of Cumberland County have made an application for the reorganization of a club and in the near future a club will be organized for this County.

The Nova Scotia Poultry Association Meeting.

The fourth annual meeting of the above Association took place at the Agricultural College on Friday, January 15th, 1916.

Representatives were present from the different clubs in the Province and matters of importance to the clubs were discussed.

A strong resolution was adopted asking for legislation to compel inspection of all shipments of eggs for export and a grading of these exports as outlined by the Canadian Poultry Producers Association. This grading was given in my report for last year.

A resolution was also adopted calling on all dealers of eggs to provide cool places in their stores for this perishable product and to use display cards in windows instead of placing the eggs in the show windows of the stores. The exposure in such windows during warm days will make eggs unfit for food in a short time. The secretary was also instructed to prepare a letter for the Press on this subject and to write dealers calling attention to this oversight on their part.

Several other important matters of interest to the poultrymen were also discussed and much valuable information placed before this meeting.

The officers elected for the year were:—

President, F. E. Jackson, North Sydney.
1st Vice-President, James Bailey, Bridgewater.
Secty-Treas., J. P. Landry, Truro, N. S.

Executive Committee:—

E. E. Frehill, W. W. Osborne, Percy Carey, W. H. Henry D. N. Brodie and J. P. Blanchard.

Exhibitions Attended.

I attended the following exhibitions as Judge of the Poultry exhibits:—Inverness, Antigonish, Musquodoboit, Stewiacke, Guysboro, Sydney, Arichat, and Bridgewater. At all these exhibitions a fair exhibit of poultry was shown but the season is not late enough for the young stock and the old stock does not look in prime condition.

I would like to call your attention to the very unsatisfactory building in which the Poultry exhibits are housed at the exhibition held at Sydney. This exhibition receives a grant for live stock and poultry from the Provincial Department, and the exhibitors have asked the commission to improve this building but no improvement has been made in the building. If it is not possible to improve this building and funds are not available for a new one I would suggest that the Poultry department of this show be cut out of the list and the poultry portion of the grant be given to the County Poultry Club. All other exhibitions attended have equipped their plant with a modern poultry building. The exhibitors at this show have not had fair treatment in this improvised shed.

The exhibits have increased at all of the exhibitions attended. At the Sydney Exhibition we erected a Demonstration two-pen Farm Poultry House and placed therein two pens of fowls. It was also equipped with trap-nests, water fountains and feed hoppers in use by the fowls. It is the intention to erect this house at one of the larger exhibitions next year.

College Poultry Plant.

During the past year we raised on the College Poultry Plant 735 chickens. We sold a larger number of stock for breeding purposes this year than any year in the past. All the pullets not required for to replace the old hens on the plant were sold to breeders in different parts of the Province. It has been our policy not to sell breeding poultry outside the Province, but in several cases we made shipments of breeding cockerels to Newfoundland and the British West Indies when we were unable to market these within the Province.

We added a Blue Hen Brooder (coal burning) to our brooding equipment which has given satisfactory results and is more economical in cost of fuel. Care is required in controlling the fire in this brooder but with a little experience it gives a steady heat and has proven a good investment.

On January 1st, we selected 30 White Leghorn pullets and 30 Barred Plymouth Rock pullets which were divided into four pens of fifteen each and a record kept of their feed and production.

During the months of March, April, May and June the eggs from these pens were sold for hatching or were put in water glass for higher markets which gave us a little more in receipts from these pens than is shown on their record.

The record work in this experiment was conducted by Mr. Dan McInnis who also has charge of all work on the College Plant. It is our intention to keep these pullets for another year and to keep their production and cost record in order to compare the records of the pullet and one year old fowls.

The following is a summary of this record as reported by Mr. McInnis.

30 White Leghorn Pullets.

	Cost of Food	No. of Doz. Eggs	Price per Doz.	Amt.	Profit	Loss
January.......	$ 3.74	14	45c	$ 6.30	$ 2.56	.....
February......	3.15	25½	40c	10.20	7.05	.....
March.........	2.40	31½	35c	11.11	8.71	.....
April..........	3.25	46½	25c	11.63	8.38	.....
May...........	3.35	51	25c	12.75	9.40	.....
June..........	2.86	44	25c	11.00	8.14	.....
July..........	2.69	35½	27c	9.59	6.90	.....
August........	3.49	34	35c	11.90	8.41	.....
September.....	3.11	38½	38c	14.33	11.22	.....
October.......	4.35	21	45c	9.45	5.10	.....
November.....	4.56	3½	50c	1.63	......	2.93
December.....	4.48	5½	50c	2.75	......	1.73
	$41.43			$112.64	$75.87	$4.66

30 Barred Plymouth Rock Pullets.

	Cost of Food	No. of Doz. Eggs	Price per Doz.	Amt.	Profit	Loss
January.......	$ 3.95	2½	45c	$ 1.13	$.....	$2.82
February......	3.24	9½	40c	3.80	.56	.....
March.........	2.90	20½	35c	7.86	4.96	.....
April..........	3.61	41	25c	10.25	6.64	.....
May...........	3.83	46½	25c	11.58	7.75	.....
June..........	3.21	34	25c	8.50	5.29	.....
July..........	3.53	24½	27c	6.55	3.02	.....
August........	4.09	27½	35c	9.62	5.53	.....
September.....	4.00	33½	38c	12.73	8.73	.....
October.......	4.66	14	45c	6.30	1.64	.....
November.....	4.78	2½	50c	1.25	......	3.53
December.....	4.82	1	50c	.50	......	4.32
	$46.62			$ 80.07	$44.12	10.67

An experiment is also under way with a lot of fifty late hatched chickens which we capronized and expect to market in March.

The production of a large number of chickens, killing and marketing of these and oversight of student practice work, with attention to trapnest work for five months in each year does not permit of one man having a deal of time to devote to experimental work.

Permission was obtained and I visited the Poultry Department of the Agricultural College at Guelph, Ont., and made a particular note of the extension work being conducted by Prof. Graham. It is along similar lines to what we are doing in this Province. The Poultrymen of Ontario have the advantage of our fanciers in that our grain prices are higher than theirs and on the average we do not get as high a price for our product by 20% as they are able to get in the Ontario City markets.

I wish to place on record my sincere thanks and appreciation to the Secretaries and other officers of the different poultry clubs in the Province for much help in the work of organizing these clubs. All of these men give freely of their time, without remuneration, to attending show work and in many cases are expected to do work which should be done by other members of the club. If the club is to be successful each and every member should be ready to assist the Secretary in his work.

Mr. Dan McInnis, assistant in charge of College Poultry Plant has also my thanks for faithful and painstaking service in the work under his control. My duties with the County Clubs take me away from the College a greater part of each year and I have always been able to depend on his good judgment in the work at the Plant.

In concluding this report I must also thank you for many evidences of continued interest in the work of this department. I would feel that my work had fallen short of expectations were it not for the interest you have shown in its progress almost continually.

All of which is respectfully submitted,

J. P. LANDRY.

PART 7—REPORT OF THE SUPERINTENDENT OF DAIRYING.

Prof. M. Cumming,
Secy. for Agriculture,
Truro, N. S.

Sir:—I beg to submit herewith my fifth annual report in connection with the Dairy business in Nova Scotia. It will be divided as follows:

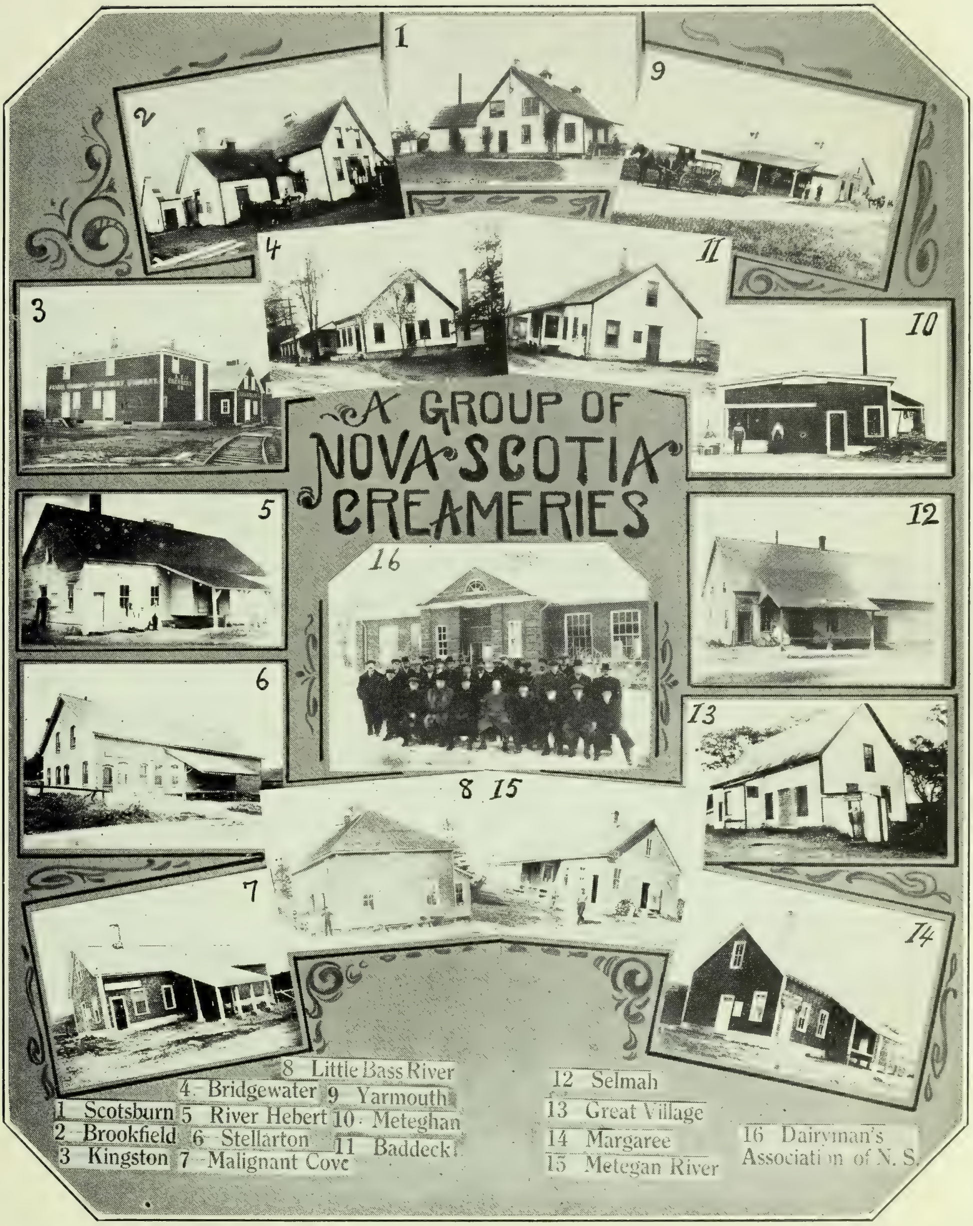
1. General.
2. Report of Dairymen's Association.
3. Statistics of butter and cheese made.
4. Report Baddeck Creamery.
5. Report Margaree Creamery.

General.

As in former years the work of the Dairy Division was directed largely towards the creamery business. Owing to the fact that the cheese business has become so small, not much time or effort was spent in that direction although I am still firmly of the opinion, as stated in former reports, that there are many sections in the Province where the cheese factory could be made the most profitable means of disposing of the dairy products. It seems however that the time is not yet ripe for development along this line but may be in the not distant future.

As to the butter manufactured on the farm no statistics were gathered during the year, but the amount appears to be holding about the same or possibly on the decrease. The quality in some parts of the Province shows improvement and more care in the system of marketing. No definite work in respect to dairy butter was attempted during the year other than to give what assistance was possible in any cases where it was asked for to overcome difficulties of one kind and another in this respect. The larger portion of this work has been done by mail and the correspondence of the Division in regard to these matters has greatly increased during the last few years.

Twenty-one creameries were in operation during the year, being a net increase of one over 1915. Registrations were granted as follows:—



A Group of Nova Scotia Creameries.

May 1, Margaree Creamery, owned by N. S. Dept. of Agriculture, situated at Margaree Forks, Inverness Co.

Aug. 9, The Intercolonial Creamery Company, Ltd., owned by co-operative company, situated in Lower South River Sta., Antigonish County.

Aug. 9, The Antigonish Dairy Co., Ltd., owned by co-operative company, situated in the Town of Antigonish.

Registrations were cancelled as follows:

June 2, The Glenholme Creamery, Glenholme, the business being taken over by the Great Village Creamery

June 2, The Farmers Milk Pasteurizing Company, Ltd., Antigonish, the business being taken over by the Antigonish Dairy Co., Ltd.

Permits for the season were granted to the Marydale and Glassburn Cheese factories in Antigonish County and to the Erinville Cheese Factory in Guysboro County.

The quantity of creamery butter manufactured was 1,586,579 lbs. at a value of about $505,734.88, a gain of 362,196 lbs. over 1915, being the largest increase of any one year in the history of the business.

Cream grading as advocated by the Dairymen's Association was followed out by a number of the creameries following a circular issued by the Division in March. Some of the creameries graded but did not make any difference in price, others made a difference of two cents per pound butter fat between the two grades, defined as follows:

Grade 1.

Cream sweet, smooth, of good flavor and containing not less than 20% butter fat.

Grade 2.

Cream that had soured, flavor not clean, slightly lumpy and containing less than 20% butter fat.

In no case was more than two grades adopted. Any cream that would not grade up to grade 2 ought to be rejected.

The value of cream grading seems to rest largely with the Creamery Manager and when carried out systematically and continuously all season, splendid results have been obtained and a higher quality of butter made. This is becoming more important yearly as the quantity increases.

All of the creameries started in recent years with the sanction of the Division may be considered to be in a good healthy condition and by looking over the statistics attached it will be seen that splendid gains have been made in many places.

The Pictou County Dairy Co. at Stellarton, made a forward move during year by installing the first mechanical refrigerating plant in connection with the creameries of the Province. This has been in operation one season and is giving splendid results.

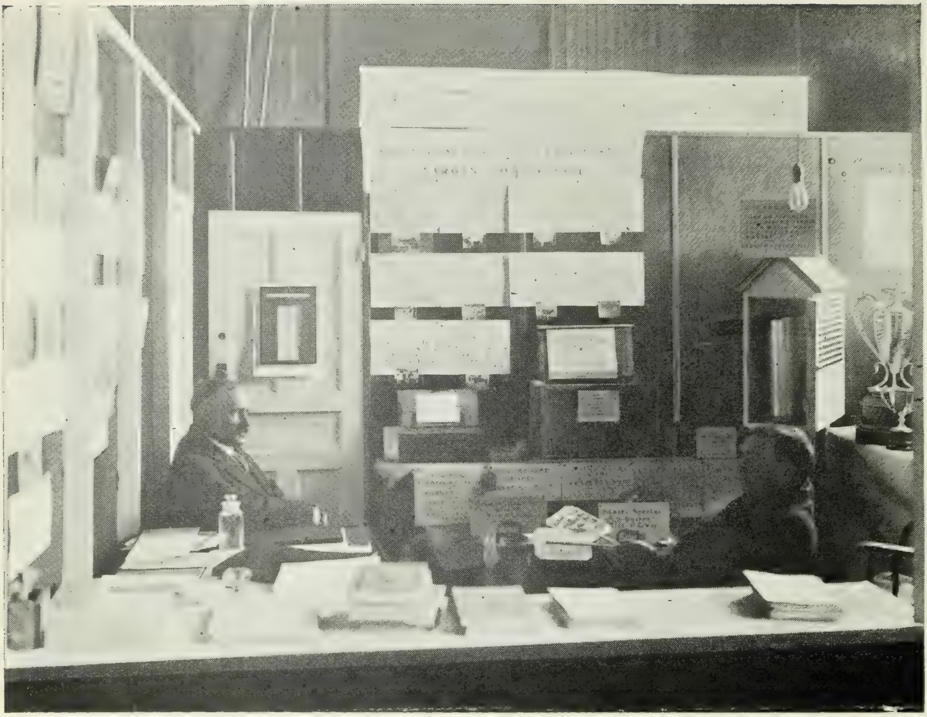
The Division again operated the creamery at Baddeck in Cape Breton with fairly satisfactory results although the output did not show an increase during the year, still progress has been made as the attached report will show.

The creamery built last year at Margaree Forks was in operation this year with satisfactory results and splendid possibilities for the future. The probabilities are that the people there are going to make the very best of the opportunity presented of developing the dairy industry in that section. The report in full of the season's operations is attached.

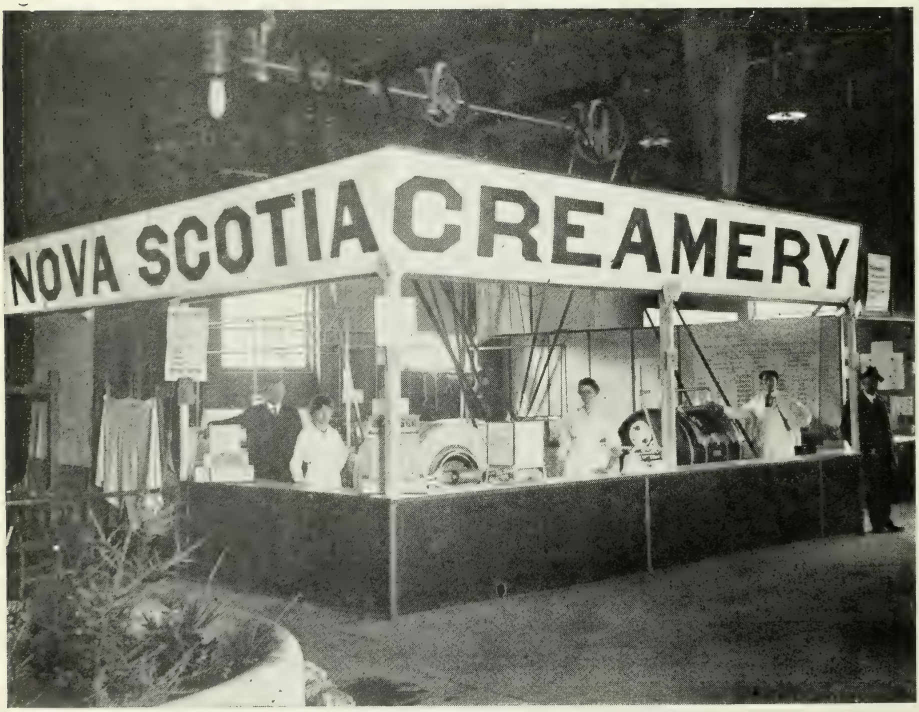
Two new creameries started during the year in Antigonish County, one in Antigonish Town and the other at South River Station. The Division used every effort possible to have these two companies united into one as a more economical means of disposing of their milk products and a saving of a large amount of capital, but they preferred to organize separate companies and both erected creditable buildings well equipped. Both have done a creditable business since starting and the prospects are that, if the people go into dairying strongly enough or anything near what the possibilities warrant, both can be made a success.

Instruction and inspection work was carried on among the creameries and cheese factories as regularly as circumstances would permit. Four features were attempted and special attention given to them, viz: cream grading, regular use of the acidimeter, the keeping of churning records and the ascertaining of the moisture content of each churning, by means of the moisture test.

Owing to the fact that my former assistant, Mr. Bird, had enlisted and it was considered best not to appoint



Nova Scotia Creameries, N. S. Prov. Ex. 1916. Office view "showing some of the essentials to make Dairying a success," by means of placards and equipment.



Nova Scotia Creameries. N. S. Provincial Exhibition Halifax, Sept. 13-21, 1916. General view, two complete creamery plants in operation daily.

another inspector while the war is on, the instruction work among the creameries and factories had to be limited to a great extent and only done as other work would permit.

A series of creamery picnics was held during the month of July as follows:

July 1st, Cumberland Co-operative Creamery Co., Ltd. River Hebert.
1st, Intercolonial Creamery Co., Lower South River.
4th, LaHave Creamery Co., Bridgewater.
6th, Milburn Creamery Co., Malignant Cove.
7th, Scotsburn Creamery Co., Ltd., Scotsburn.
11th, Margaree Creamery, Margaree Forks.

The attendance at these picnics was from 250 to 1500 people. Meals, refreshments and social entertainments were provided by the local associations. The Creamery Management in most places had the creamery in operation all day demonstrating and explaining the working of the different parts of the plant. A program on different phases of creamery work was carried out during the afternoon, addresses being delivered by Mr. Geo. H. Barr, Chief of the Dairy Division at Ottawa, Mr. Harvey Mitchell, Maritime Representative of the Dairy Division, Ottawa, different members of the Provincial Dept. of Agriculture and Agricultural College, and others. The Hon. Mr. Murray, Premier of Nova Scotia, attended the Margaree Picnic and delivered an address. These functions created much interest in the work, gave a better understanding between the creamery and its patrons and gave the impression that they were worth repeating in coming years.

The Division conducted a "Nova Scotia Creameries" booth at the Provincial Exhibition in Halifax, Sept. 13-21. A double complete creamery outfit was in operation daily, the machinery being loaned by The DeLaval Dairy Supply Co. and the C. Richardson Co. for the purpose. Butter was made daily and everything kept in operation from 10 a. m. to 9 p. m. In the office attached were the "Essential to make Dairying a Success" placarded and demonstrated as nearly as circumstances would permit. We were assisted in this by different members of the Federal Dept. of Agriculture.

The first three months of the year I spent most of my time at the College doing instruction work. The summer was spent as much as possible among the creameries and doing some preliminary organization work in sections which have not yet done much in Dairying, judged the dairy products at a number of the Fall Exhibitions. Some time was also spent in connection with the Cereal Mill at Baddeck.

The accounts of the two Government Creameries and the checking of the accounts of the Cereal Mills was done in the office here. This and the other office work was attended to by Miss M. M. Caldwell to whom my appreciation is due for the accurate, careful and obliging way in which the work was done.

The usual grants to new creameries was made during the year.

Valuable assistance continues to be rendered the Dairy business in Nova Scotia through the Dairy Division of the Dept. of Agriculture at Ottawa, especially through the Dairy Recorders under direction of Mr. Harvey Mitchell. Four men are now engaged in this work in the English speaking portion of the Province and two men in the French sections in Digby County. Aside from their duties as Recorders they have rendered much assistance in the Dairy work in many other ways.

About the usual number of meetings was held in different sections. I was assisted in this respect by Mr. D. W. Murray, Pres. of the Dairymen's Association, who addressed meetings during the year in connection with the Cumberland Co-operative Creamery Co., Ltd., The Milburn Creamery Co., Ltd., and The LaHave Creamery Co., Ltd. These meetings were only held when there was something special to present to the people and this wa, found to be the most satisfactory way of doing it.

In summing up, the year might be considered a poor one for the cheese business but quite satisfactory for the creamery business, although not nearly as much progress was made as the possibilities and the extremely high prices of creamery butter warranted. The creamery business no doubt is the best means of disposing of dairy products in the larger portion of the Province.

The foundation for this work seems to be laid. The creameries are now fairly well scattered all over the province and becoming better manned.

The Dairymen's Association is on a good working basis ready as an advisory board to direct and advise as development takes place. Suitable legislation has been passed and is being enforced for the needs of the business.

The great need then is a larger and more economical milk production and apparently the three great factors which must go hand in hand and work together for this end are:—

The creamery to handle the product satisfactorily and economically after it is produced.

The further development of the Cow Testing Association work until every person in the Province who keeps cows will be in a position to know definitely what each animal in the herd is doing and in a position to weed out the poor cows and raise his standard annually.

A strong propaganda for the further use of the Agricultural Societies as a medium of getting the proper sire stock and for the diffusion of the principles of breeding and feeding.

When these three agencies which are now in operation and within the reach of every farmer in the Province are utilized by the farmer up to the extent of the objects they seek to convey, it will revolutionize the Dairy business beyond the highest conceptions that we have of it at the present time, but not until then will the Province show a real permanent development in Dairying.

The same co-operative spirit that has existed since the Division was established still exists between the Provincial Dairy Division and the Dairy Division at Ottawa. There is no overlapping of work but each Division working along individual lines and lending assistance to the other when possible. My appreciation is especially due during the past year for the very material assistance given by Mr. Barr, Mr. Mitchell, the Dairy Recorders and other men from the Federal Department at different times. The portion of the Federal Grant which was apportioned to Dairying also rendered valuable assistance to the industry.

The Creameries and Cheese Factories have again given freely of their numbers to the defence of the Empire. The following have enlisted during the year, making a total of twenty-two men since the war began:

Douglas R. Dickie, Stirling Brook.
Fred Duncanson, Wolfville.
D. J. Wile, Bridgewater.
Camille J. Comeau, Meteghan River.
Chas. Wm. Spencer, Scotsburn.
John McAdam, Marydale.
Joseph Boyd, South River.
Dan. Boyd, South River.
Harold Lewis, Little Bass River.
G. Edmund Myers, Malagash.
Geo. A. Clarke, Formerly Asst. Dairy Supt.

Mr. J. D. McKenzie, Mgr. LaHave Creamery Co., also enlisted, but due to pressure brought to bear by his patrons and business men of the town, was released.

My appreciation is due to all who have in one way or another assisted in the development of the Dairy Industry during 1916.

Respectfully submitted,

W. A. MACKAY.

Dairymen's Convention of Nova Scotia, 1916.

The third Annual Convention and first Dairy Product Exhibition of the Dairymen's Association of Nova Scotia, being the fourth annual gathering of the Dairymen, was held in the Agricultural College, Truro, on Jan. 5th and 6th, 1916.

The opening session on the evening of Jan. 5th was open to Short Course students and the public generally. About 300 present. Addresses were delivered by the President, C. W. McDougall, Supt. of Dairying for New Brunswick; Harvey Mitchell, Maritime Representative of the Dairy Division, Ottawa; Joseph Burgess, Cold Storage Inspector, Ottawa. Report on Dairying by W. A. MacKay.

Address and Presentation of Special Prizes, by Prof. J. M. Trueman. The list of Prize winners in the Dairy Product Exhibition was as follows:—

Section 1.—56 *lb. Box—October Butter.*

1.	Scotsburn Creamery Co., Scotsburn	96.03
2.	Brookfield Creamery, Brookfield	95.76
3.	South River Creamery Co., Loch Katrine	95.66
4.	LaHave Creamery Co., Bridgewater	95.13
5.	Baddeck Creamery, Baddeck	95.03
6.	La Societe de Industrie Laitiere, Meteghan	92.96
7.	Pictou Co. Dairy Co., Stellarton	92.93
8.	Lawrencetown C. & B. Co., Lawrencetown	92.80
9.	Yarmouth Creamery Ltd., Dayton	92.50

Section 2.—28 *lb. Box* (*New Made*).

1.	Yarmouth Creamery Ltd.	96.06
2.	Brookfield Creamery	96.03
3.	Scotsburn Creamery Co	95.70
4.	Pictou Co. Dairy Co.	92.60
5.	T. M. Blaikie	92.20

Section 4—10 *lb. Prints* (*New Made*).

1.	Brookfield Creamery	96.3
2.	Scotsburn Creamery Co.	95.8
3.	Yarmouth Creamery Ltd	95.63
4.	T. D. Blaikie	95.6
5.	Lawrencetown C. & B. Co	94.1
6.	Pictou Co. Dairy Co.	93.2

Specials.

Windsor Salt Special by Canadian Salt Co.

1.	Brookfield Creamery	$15.00
2.	Yarmouth Creamery	10.00
3.	Scotsburn Creamery	8.00
4.	South River Creamery Co	4.00

DeLaval Dairy Supply Co., Peterboro, Ont.

Silver Trophy, valued at $25.00, won by Brookfield Creamery.

C. Richardson & Co., St. Mary's, Ont.

2 Silver Trophies, valued at $15.00 and $10.00.

1. Scotsburn Creamery Co.
2. Brookfield Creamery.

Butter Buyers' Trophy, value $125.00, donated by Smith & Proctor, R. B. Colwell, Nickerson & Co., and Smith & Proctor, Ltd., and Harris Abbattoir Co., Sydney.

To become the property of the exhibitor of the highest scoring butter at the Exhibition. Winner shall hold it for one year but it must be won three times before becoming his absolute property. Won by Brookfield Creamery.

The Exhibition was held in the College Dairy, the judging being done during the day. Judges—Messrs. Harvey Mitchell, G. W. McDougall and Joseph Burgess, each scoring separately and the average for the three scores being taken as the official score.

Butter Scoring Competition Awards.

1st. F. A. Illsley, Berwick.
2nd. Harold Falconer, Stellarton.
3rd. J. R. Sutherland, Baddeck.
4th and 5th, tie—J. E. Falt, Antigonish, and A. Cameron, Loch Katrine.

The officers for the current year were appointed as follows:—

Directors: D. W. Murray, Scotsburn.
R. B. McLennan, Brookfield.
A. M. Wheaton, Wolfville.
C. R. DeLong, New Germany.
Alex. Cameron, Lower South River.
Auditor: C. R. B. Bryan, Truro.

Resolutions were passed recommending amendments in the Dairymen's Act and that an Act be drafted forming the Dairymen's Association, that Cream Grading be adopted by all the creameries, that the exhibit of butter, and Scoring Contest be carried on again next year. Other resolutions of thanks and felicitation were passed.

At the time of writing, Dec. 1st, 1916, arrangements are being made for the next Annual Convention to be held during the Short Course.

Respectfully Submitted,

W. A. MacKAY,
Secy.-Treas.

Dairymen's Convention of Nova Scotia Jan. 3 and 4, 1917.

The fourth Annual Convention and second Dairy Product Exhibition of the Dairymen's Association of Nova Scotia, being the fifth annual gathering of the Dairymen, was held in the Agricultural College, Truro on Jan. 3 and 4, 1917.

Delegates were present from nearly all the creameries in the Province and from some of the cheese factories. The opening session on the evening of Jan. 3rd, was open to the Short Course students and the public generally, about 300 present. Addresses on different phases of the dairy business were delivered by the President, Mr. D. W. Murray, Prof. J. W. Mitchell, Fredericton, N. B., Joseph Burgess of the Cold Storage Division, Ottawa; report on Dairying for 1916, by W. A. MacKay. The special prizes in the Dairy Product Competition were presented by Mr. Burgess. The list of prize winners in the Dairy Product Exhibition was as follows:

Section 1—56 *lb. Box of October Butter.*

		Score
1.	Scotsburn Creamery Co., Scotsburn	93.8
2.	LaHave Creamery Co., Bridgewater	93.3
3.	Antigonish Dairy Co., Antigonish	93.0

Section 2—28 *lb. Box Butter* (*new made*).

1.	LaHave Creamery Co., Bridgewater	96.4
2.	Scotsburn Creamery Co., Scotsburn	96.
3.	Acadia Dairy Co., Wolfville	95.7
4. Tie	Brookfield Creamery Co., Brookfield	94.9
	Pictou County Dairy Co., Stellarton	94.9
5.	Antigonish Dairy Co., Antigonish	94.7
6.	T. D. Blaikie, Great Village	93.5
7.	Yarmouth Creamery, Ltd., Dayton	93.1

Section 3—*Prints— Not less than* 30 *lbs.*

1. Tie	LaHave Creamery Co., Bridgewater	96.1
	Acadia Dairy Co., Wolfville	96.1
	Scotsburn Creamery Co., Scotsburn	96.1
2.	Brookfield Creamery Co., Brookfield	95.7
3.	Pictou County Dairy Co., Stellarton	94.8
4.	Antigonish Dairy Co., Antigonish	94.3
5.	Yarmouth Creamery, Ltd., Dayton	93.4
6.	Bayview Creamery Co., Stirling Brook	93.
7.	T. D. Blaikie, Great Village	92.9

Windsor Salt Special.

1.	LaHave Creamery Co., Bridgewater	$12.00
2.	Scotsburn Creamery Co., Scotsburn	10.00
3.	Acadia Dairy Co., Wolfville	8.00
4.	Brookfield Creamery Co., Brookfield	4.00

DeLaval Trophy.

Brookfield Creamery, Brookfield.

C. Richardson & Co.

Scotsburn Creamery, Scotsburn	1st Trophy
LaHave Creamery Co., Bridgewater	2nd Trophy

J. B. Ford & Co.

Scotsburn Creamery Co., watch.

Butter Buyers' Trophy.

LaHave Creamery Co., Bridgewater.

The Exhibition was held in the College Dairy, the judging being done during the day. Judges, Harvey Mitchell, C. W. McDougall and Joseph Burgess, each scoring separately and the average of the three scores being taken as the official score.

Second Session, N.S.A.C. Jan. 4th,

The morning session met in the College Dairy at 9 a. m. for a Butter Scoring Competition. About 18 participated.

Awards were made as follows:

1 and 2—tie—J. D. McKenzie, Bridgewater.
G. W. Parker, N. S. A. C., Truro.
3 Harold Falconer, Stellarton.
4 Alex. Cameron, South River Station.
5 Alvin Graham, Scotsburn.

After the scoring Competition Mr. C. W. McDougall led a discussion on the quality of butter on exhibition and suggestions for improvement were brought out from many present. The other judges and Mr. Proctor, of the firm of Smith & Proctor, Halifax, took part in the discussion.

At the afternoon session the following officers were elected:

Directors: D. W. Murray, Scotsburn.
A. M. Wheaton, Wolfville.
C. R. DeLong, New Germany.
H. Falconer, Stellarton.
Alex. Cameron, Lower South River.
Auditor: C. R. B. Bryan, Truro.

A number of questions of much interest to the creamery men were discussed and a number of resolutions passed, chief among them being the further adoption of cream grading, that the Association place themselves on record as being opposed to the lifting of restrictions on oleomargarine, resolutions affecting butter boxes, creamery insurance, and resolutions of thanks and felicitation. It was also agreed that the Convention meet at the same time and place next year.

W. A. MacKAY,
Secy.–Treas.

Truro, Jan. 19, 1917.

REPORT OF THE CHEESE FACTORIES AND CREAMERIES FROM DEC. 1, 1915 TO NOV. 30, 1916

County	Registration	Name of Cheese Factory or Creamery	Name of Prop. Pres. or Secy.	Name of Manager Cheese or Butter-maker.	P. O. Address	No. of Patrons	Total Lbs. of Milk Received	Total Lbs. Cream Received	Total Lbs. Cheese Made	Total Lbs. Butter Made	Quarts Ice Cream Made	Quarts Sweet Cream Sold	Value of Business Done	Spent in Improvements
Annapolis...	1	Lawrencetown C. & B. Co..	J. B. Jefferson...	A. W. Clark......	Lawrencetown...	130	....	310125	.....	66227	.....	......	19462.10	300.00
Antigonish...	2	South River Cry. Co.......	J. T. Keating....	Robt. Cousins.....	Loch Katrine....	250	....	260349	.....	87303	.....	......	2767991	400.00
	3	Milburn Cry. Co..........	J. A. MacDonald	H. A. McDonald..	Malignant Cove..	168	....	122000	.....	40454	.....	......	12166.37	35.00
	23	Antigonish Dairy Co.......	J. R. Thompson..	J. E. Falt........	Antigonish.......	166	298765	201203	.....	36068	.....	33145	21960.74	4139.00
	24	Intercolonial Cry Co.......	D. Fraser........	A. Cameron.......	South River Sta..	125	....	90276	.....	25791	.....	4000	8771.79	4000.00
	Permit	Marydale Cheese Factory...	Geo. Vinten......	Dan McDonald...	Lr. South River..	16	200500	....	18400	....	.....	......	3300.00	....
	"	Glassburn Cheese Factory..	"	Dan Chisholm....	" "	13	170000	....	15200	....	.....	......	2650.00	....
	"	Erinville Cheese Factory...	"	J. Redding........	" "	15	141500	....	12700	....	.....	......	2220.00	....
Colchester...	4	Brookfield Cry. Co.........	R. B. McLennan.	W. L. Brenton....	Brookfield.......	95	75805	195872	.....	32623	819	49302	25656.00	200.00
	5	Economy and Bass River C. and B. Co...........	S. H. Fulton.....	W. C. Lewis......	Little Bass River.	29	181555	20215	.....	13344	.....	20	4250.00	....
	7	Great Village Creamery....	T. D. Blaikie....	Edwin Blaikie.....	Great Village....	85	511602	138847	.....	45323	.....	22903	21357.50	300.00
Cumberland	8	Cum. Co-op. Cry Co.......	W. A. Landels....	Harry M. Aitken..	River Hebert....	75	....	148801	.....	42507	8672	164	15725.64	....
	20	Malagash C. & B. Co., Ltd.	J. T. Treen......	H. H. Gillis.......	Malagash Centre.	32	512654	....	48427	....	.....	......	7682.44	....
Digby.......	9	Clare Cry. Co., Ltd........	E. U. Doucet....	L. C. LeBlanc.....	Meteghan River..	130	....	84087	.....	28000	.....	......	8000.00	80.00
	10	La Societe deIndustre Laitiere of Meteghan, Ltd..	Z. Melanson.....	Narcisse Roberge..	Meteghan.......	87	387932	....	.....	22629	400	200	7162.95	500.00
Hants.......	11	Bayview Cry. Co.,Ltd.....	B. H. Power.....	J. D. Neil........	Stirling Brook....	120	....	222042	.....	74014	.....	......	31000.00	450.00
Inverness....	22	Margaree Creamery.......	N. S. Dep. of Ag.	J. R. Sweeney.....	Margaree Forks..	116	....	82503	.....	24113	.....	......	7531.35	5476.98
Lunenburg...	12	LaHave Cry. Co., Ltd.....	J. D. McKenzie..	Fred Fraser......	Bridgewater.....	544	....	654396	.....	211706	9734	1462	73156.34	200.00
Kings.......	13	Acadia Dairy, Ltd.........	C. H. R. Starr...	A. M. Wheaton...	Wolfville........	225	....	325000	.....	101648	5000	2000	38000.00	....
	14	Acadia Creamery..........	Acadia Canning & Cry. Co., Ltd..	G. R. Toole.......	Kingston........	18	....	52000	.....	15230	.....	......	5323.50	....
	15	Fairview Creamery........	Illsley Bros......	F. A. Illsley.......	Berwick.........	40	....	85800	.....	28600	.....	......	9438.00	150.00
Pictou......	16	Scotsburn Cry. Co., Ltd....	Robt. T. Stewart.	Alvin Graham....	Scotsburn.......	500	....	1076945	.....	323300	.....	......	104475.62	875.00
	17	Pictou Co. Dairy Co., Ltd..	Harold Falconer..	John A. MacKay..	Stellarton.......	391	....	352917	.....	112390	.....	2021	33133.26	3800.00
Victoria.....	18	Baddeck Creamery........	N. S. Dep. of Ag.	J. R. Sutherland...	Baddeck........	104	....	104489	.....	35211	120	633	10991.60	87.75
Yarmouth...	19	Yarmouth Cry. Co.........	F. E. Porter.....	F. E. Porter......	Dayton.........	417	....	684750	.....	200398	.....	7572	67945.88	400.00
						3891	2480313	5212717	94727	1586679	24745	123424	569040.99	21393.73

W. A. Mac Kay, Esq.,
Dairy Superintendent,
Truro, N. S.

Sir:—I herewith submit my third annual report as Manager of the Baddeck Creamery.

The creamery opened on May 3rd, with excellent prospects for a good season's business and was aided during May and June by ideal weather for milk production. Although the make of butter for these two months was not so large as we anticipated, the increase was about 25% over the same two months the preceding year.

The remainder of the season, however, was not so encouraging and the output of butter dropped slightly below that of 1915. This might be partly attributed to the dry weather during July, August and September and partly to poor transportation from certain districts.

One very encouraging feature of the business is that patrons have been sending cream since the creamery opened three years ago, have increased their supply of cream from 50% to 100%, and we feel that the final success of the creamery depends not only on getting more patrons but also on the determination of each patron to increase his production each year.

The prospects for the season of 1917 are very encouraging. Never were prices so high. With this incentive and the confidence manifested by the people there should be no question as to the success of the year's business.

After Oct. 1st, the creamery was operated by Fred I. Murray, who remained in charge until Nov. 15th, at which time the creamery was closed for the season.

In conclusion I wish to thank yourself and others for the help and encouragement given me during the season.

Respectfully,

J. R. SUTHERLAND.

BADDECK CREAMERY.

Capital Account.

Cost of plant and equipment paid in full.........................$6592.16

STATEMENT OF ASSETS AND LIABILITIES DEC. 31, 1916.

Assets.		Liabilities.	
Plant and Equipment	$6592.16	Dept. of Agr. Plant & Equipment	$6592.16
Inventory Capital Account	68.88	Dept. of Agr. Balance on Current Account, including int. on Cap. acct to Jan. 1st, 1916	1352.14
Inventory Current Acct	336.60	Outstanding Accts	16.47
Outstanding Accts, Good	199.49	Year's Int. on Cap. Acct	329.60
Excess of Liabilities over assets	1407.87	Bal. on Cash Acct	314.53
	$8604.90		$8604.90

Note.

The liabilities on Dec. 31, 1915 were $804.78 greater than the assets. On Dec. 31, 1916, they were $1407.87, leaving loss on year's trading at $602.09, including interest on Capital but not on balance on current account. Not including any interest the net loss on the year's trading would be $272.49. This is higher than last year due to cost of supplies, wages, fuel, etc. being higher than during 1915.

Improvements were made to the plant to the extent of $75.25 during the year, which was charged to General Agriculture and not to Capital Account.

A full itemized statement of the cash account, monthly and patrons' accounts has been published separately and may be had on application.

W. A. MacKay, Es .,
Dairy Superintendent,
Truro, N. S.

Sir:—I beg to submit herewith my report as Manager of the Margaree Creamery for the season of 1916.

The Margaree Creamery opened for business on May 15th, but on account of the cold, backward Spring which prevailed in this County, we did not get well started before the first week in June. As this creamery is without railway or steamboat communication, all the cream was hauled by teams. The creamery supplied double decked conveyances fitted with springs, for this purpose and in almost every case where the cream left the farm in good condition, it was delivered in these waggons without any serious results even from the extreme end of the routes, which is fifteen miles from the creamery. While this system of gathering cream proved quite expensive, it is the only means of reaching these extensive outlying districts and the majority of the patrons expressed themselves in favor of its continuation.

Cream grading was adopted from the start and I firmly believe its effect improved the quality of the cream received at least 25%. It being the first season of operation, we did not grade very close but by another season the patrons will have prepared for the cooling of their cream and a higher quality should be expected.

About the first of July we were severely handicapped by the shortage of cream cans and on account of this condition we were only able to accomodate 116 patrons which was very disappointing to a large number who desired to patronize us. Yet in spite of this serious drawback we made 24115 lbs. of butter before the creamery closed on Oct. 28th.

On the 11th of July the patrons held a picnic to celebrate the formal opening of the creamery. The day proved fine and a large crowd assembled to see the creamery. in operation and to hear instructive speeches delivered by representatives of the Dominion and Local Departments of Agriculture.

The creamery is centrally located in a great agricultural valley with unlimited possibilities as a dairy farming district, and now it depends upon the farmers themselves to revolutionize the production end of the industry by a more thoroughly cultivated area of selected crops and more judicious feeding of their dairy cows. During the past season many farmers following our suggestion, sowed a patch of oats, peas and vetches, which they learned the great value of in August and September when it supplemented the failing pastures and kept up the supply of milk, while their neighbors who had not made any preparations suffered severely on account of the very dry season.

Again, if the farmers want to get the most from their cows, they must arrange to have them freshen in the fall and follow winter dairying when prices are highest. The majority are entirely satisfied with the results of the past season and a large increase is assured for next year.

Five meetings were held in May at which I endeavored to outline the details of creamery management.

At the County Exhibition, held in Inverness on Sept. 5th and 6th, I placed the awards in the dairy classes and had charge of a creamery booth where dairy literature was handed out and I met a number of interested visitors desiring information regarding the creamery.

After spending a season in the Margaree Valley, I am convinced that if the farmers pay more attention to dairying and continue in the spirit of co-operation which has just been aroused, there is a very bright future for the Margaree Creamery and before many years it will take it's place among the older creameries which its possibilities has destined it to attain.

In conclusion, I wish to thank you, as Dairy Superintendent, for the special interest you have taken in my work I also wish to thank the people of Margaree for kindness accorded me throughout the season and I trust that pleasant co-operation will be continued with succeeding managers to the best interests of the Margaree Creamery.

Respectfully,

J. R. SWEENEY.

MARGAREE CREAMERY.

Capital Account.

Cost of Plant and Equipment to date	$5476.98
Still Owing	30.00
	$5506.98

STATEMENT OF ASSETS AND LIABILITIES NOV. 1, 1916

Assets		Liabilities	
Plant & Equipment	$5506.98	Dept. of Agriculture for Plant and Equipment	$5506.98
Inventory Capital Acct	27.69	Dept. of Agriculture Balance on Current Acct	594.49
Inventory Current Acct	243.96	Year's Interest on Capital Account	275.35
Outstanding Accounts	.40	Balance on Cash Account	194.70
Excess of Liabilities over Assets	792.49		
	$6571.52		$6571.52

Note.

This shows the net loss on the year's operations to be $517.14 not including the year's interest on investment. The cream hauling cost $538.51 and the butter hauling $102.30, and we only charged the patrons one cent per pound butter for this service or a revenue of $241.13, a loss of $399.68. Outside of this the deficit would only be $117.46.

It is apparent, owing to local conditions, that to put this end of the business on a commercial basis that a higher price will have to be charged for hauling the cream.

A full itemized statement of the cash account, monthly and patrons' accounts has been published separately and may be had on application.

Report of Nova Scotia Government Cereal Mill.

Prof. M. Cumming,
Secy. for Agriculture.

Sir:—I beg to submit my second Annual Report in connection with the Cereal Mill at Baddeck.

This now consists of four separate units: A Flour Mill, An Oatmeal Mill, A Buckwheat Mill and a Feed Mill. The object of installation being to experiment as to the suitability of wheat, buckwheat and oats for milling purposes in the Province. The mill was established in a section not the most favorably situated but if the business can be put on a commercial basis in this section it will be very suitable for many other sections. Up to the present the experiments have not been carried far enough to prove anything definite.

The feed mill was started early in the year and is giving good satisfaction and enables the farmer to have his grain ground satisfactorily, operating with gasoline however makes the cost of grinding at the present time quite high.

The flour mill was also started early in the year. The miller, Mr. MacLean, met with considerable difficulty through getting wheat that was entirely too soft for milling also a considerable amount of smut. Many grists had to be returned.

Where suitable wheat was obtained, the customer got a splendid quality of flour as the attached clippings will show. Also the Midget mill is especially suitable to customer work as a customer can get back nearly the flour out of his own wheat. This was not possible with the long system mills.

During 1915 not much wheat was grown but during 1916 there was a tremendous increase in the acreage planted and for the last two months the flour mill has been running full time. There is little doubt but this branch of the business can be made a commercial success. The only question is cost of power and insurance. Gasoline at present prices makes high cost of milling.

Clippings from Customers.

Point Clear,
Boularderie, C. B.

"*Geo. E. McLean,*
Baddeck, C. B.

I am in receipt of flour which is in quality equal to any used by us from the Western mills."

E. GILLIS.

River Denys Centre.

"*Geo. E. McLean*
Baddeck, C. B.

The flour is fine, equal to any imported, white and of the best taste when cooked."

DUNCAN CAMERON.

Sydney, Oct. 25.

"*Sir*:—I may say that I had some of your product last summer and without flattery, I consider it very much superior to the imported whole wheat flour."

A. G. McLEOD.

Red Islands, Sept. 29, 1916.

"*G. E. McLean,*
Baddeck, C. B.

I received the flour O. K. in due time. I should have been pleased to have it nearly as good as the flour we get from the West, but this flour you made was not only just as good but in my opinion it was better than the best grade of flour we get from the West."

JOSEPH J. McKENZIE.

The past season was a good one for maturing wheat in Cape Breton. The quality of wheat is improved but still there is a large percentage coming to the mill of a quality that it is impossible to make good flour. Some education will have to be carried on along this line.

A buckwheat flour plant was installed during the season and is now working satisfactorily. This only starting there is nothing to report yet.

The Oatmeal plant was installed with the object of making the old fashioned smoke kiln dried oatmeal and to get it in as near a perfect form as possible. Many difficulties were encountered in this and up to the present time they have not all been overcome but we think that these can be perfected in time. Some oatmeal has been made but this end of the business might be reported as not working satisfactorily.

I consider that we are fortunate in securing the services of such a competent man as Mr. Geo. E. McLean as Manager. He has given his best efforts to the work during the year, has overseen the installation of all the different machines, is courteous yet firm with his customers looks carefully after the business in all its details and above all is a good practical miller.

The work will require some more years of experimenting before it would appear wise to me to draw any definite conclusion.

Respectfully submitted,

W. A. MacKAY.

PART 8—REPORT OF THE CHEMIST.

M. Cumming, Esq.
Secretary for Agriculture

Sir:—I have the honor to submit my fourth annual report of the work of the Chemical Department of the Agricultural College.

The activities of this department are considered under the following heads:

1. Teaching.
2. Routine Analysis.
3. Experimental.

The completion of the Science building is affording an increasing opportunity for development especially along the first two lines of work. Owing to delays in the arrival of sinks and other important fittings for the laboratory which had been ordered from England, we were not able to use the laboratory until January and then under restricted conditions. Permanent sinks were not put in place until August.

Chemicals and apparatus for supplying our immediate needs have been cautiously ordered. In some cases it has been impossible to get certain standard pieces of apparatus, so that some time has been spent devising equipment for furnishing distilled water, hydrogen sulphide, for fat, nitrogen and ash determinations and for physical analysis of soils.

During the summer of 1915 Mr. V. B. Robinson a member of the senior class at this college assisted me in the laboratory; after the college opened his services were irregular but very satisfactory under the conditions. Since June 1st, 1916 Mr. J. G. Archibald, a graduate of this College, has been assisting in this department. His services are very satisfactory, especially in the analytical work. Section 9 of this report was prepared by Mr. Archibald.

Section 1. *Teaching.* The classes in chemistry made satisfactory progress; but in geology, while attempting to make the course as practical as possible we were hampered by unfavorable weather for field work in November and by the lack of a suitable collection of rocks for class work. An effort is being made this year to build up a collection of typical rocks, soils, and other material of agricultural interest.

Instruction outside the college has been given in talks before agricultural societies, by circulars, and correspondence arising from the examination of material sent in for analysis. This department feels that in order to make its work in analyzing material more effective, the results should be discussed with the farmer individually. Or in cases where any general study of the soil and agricultural resources of a community has been made, the information so obtained should be presented and explained at a meeting held in that section.

Section 2. *Routine Analysis.*— During the year 379 samples have been analyzed more or less fully and information sent out to the interested parties. These are classified as follows:

		No. of samples.
Sub-section 1.	Drinking water	5
2.	Wheat	3
3.	Manures and natural fertilizers	8
4.	Fodders	18
5.	Gypsum	1
6.	For entomological Dept.	5
7.	Limestone rock and marls	92
8.	Ordinary soils. Complete analysis	88
9.	Muck soils	14
10.	Lime requirement of soils	148

The following comments on the above sub-sections may be of interest:

1. *Water.*

In the plaster areas of Nova Scotia the well water is often very hard. One of these waters has 2600 parts of plaster per million parts of water. Since 500 parts are considered a maximum for a usable water we must consider this one very unsatisfactory not only for washing but also for drinking. There is no way of improving a drinking water loaded with gypsum so that in localities where such water prevails recourse must be had to rain water or bored wells which reach below the strata which contain gypsum.

If the water is used in steam boilers an addition of carbonate of soda will change the gypsum into limestone which does not form such hard crusts on the inside of the boiler.

Sub-section 3. *Manures and Fertilizers.*

Laboratory No. 212 consists of hake skins, fairly well dried

Laboratory No. 213 consists of fish bone and flesh without skin. Both of these are refuse material from a factory in Lunenburg, N. S.

Analysis showed as follows:

	Water	*Nitrogen*	*Phosphoric acid.*
No. 212	11.78%	6.56%	3.8 %
No. 213	33.6 %	4.32%	5.03%

Fish scrap, containing as little oil as the cod, decays fairly rapidly especially in the warm moist seasons and in sandy or loamy soils. The phosphoric acid is about as available as in ground animal bone. The skin should, in time, supply 120 lbs. of nitrogen and 75 lbs. of phosphoric acid. In fishing communities where some farming is carried on, every effort should be made to get all fish heads, entrails and other waste material into the ground or supplied to some fertilizer factory. For the first year such a fertilizer should be supplemented with some more easily soluble phosphate fertilizer as acid phosphate and potash when obtainable. This fish scrap has 27.6% of material soluble in water; a large part of this is common salt which, according to experiments reported from Washington, D. C. may to some extent, do the work of potash fertilizers.

Laboratory No. 311. Phosphate rock from Wentworth, Cum. Co., contains 1.96% of phosphoric acid while the residual soil nearby has 1.6%. In both cases the phosphoric acid is quite insoluble and consequently would be of no value except where the cost might allow some of it to be hauled on the land adjoining the residual soil.

Laboratory No. 355. Clay from Inverness Co. This was taken from a well some years ago and "has continued to give good hay, especially clover." Inquiry was made as to whether this would take the place of ground limestone. Analysis showed that while there was no limestone present it was not at all acid. This fact together with the .4% of phosphoric acid and the potash always present in clays would account for the vigorous growth of grass and clover.

Laboratory No. 363, is a fertilizer composed of 30.7% of phosphate of lime that is, 13% of phosphoric acid and 43.5% of carbonate of lime. The phosphoric acid is not available and is worth about $7.80, the carbonate of lime about $2.00. For permanent soil improvement it might pay to use this material at about $12.00 per ton landed at the farm. Used to give immediate returns on general crops it is almost useless.

Laboratory No. 380 is sphagnum moss. There is a custom in some parts of Lunenburg Co. of hauling this moss for banking at the house. In the spring this is removed and put in the pig pen as an absorbent. The idea of the user was that it was "great stuff." Analysis shows that the material as hauled has:—

Water	85.4 %
Nitrogen	.03%
Phosphoric acid	.06%
Ash	1.6 %

The fact that in 1 ton of it there is only .6 of a pound of nitrogen worth about 10c and 1 pound of phosphoric acid worth 5 cents dispels the idea that the material is worth hauling very far especially when wet. Straw or black swamp soil would not only be a much better absorbent of liquid manure, but would, of themselves, provide much more plant food than the moss. It is too often true that the time spent by man and team in obtaining such material is undervalued and would give better returns if put on more thorough cultivation of the soil especially in the fall.

Section 4. *Fodders*. Number 379 is a wild hay obtained in Shelburne Co. The grass is grown on the narrow meadows along the rivers, not over 1 ton to the acre, is cut by hand, made under difficulties and often has to be hauled long distances.

The analysis of this hay is compared with that given by Henry of timothy hay.

Meadow hay.	*Timothy.*
Water 13.15%	13.2
Ether extract 1.9%	2.5
Protein 6.29%	5.9
Ash, 7.55% mostly insoluble	5.5
Carbohydrates, 71.11%	74.

The justifiable conclusion from the above is that it might be more profitable to cultivate the cleared land and grow more of a fodder with a higher food value.

Some preliminary analyses of silage material have been made as follows;

ANALYSIS OF FODDERS.

		Water	Ether extract	Protein	Ash.	Carbohydrate
No. 258	Corn silage, Agr. College, Mar. 1916	78.6	1.06	1.70	1.16	17.48
" 286	Corn silage, New Germany, Mar. 11-16	79.3	.91	1.49	1.5	16.80
" 228	Oats, peas & vetch, Agr. College, Feb. 1-16	75.00	1.50	2.58	2.71	18.21
" 317	O. P. V. & wheat, Agr. College, Aug. 1-16	76.27	.53	2.62	1.80	18.78
" 322	O. P. V. & wheat, Agr. College, Aug. 10-16	72.79	.91	3.14	1.80	21.36
" 320	Pea plant used in 317 Agr. Col., Aug. 10-16	85.84	.33	2.20	.67	10.96
" 321	Wheat plant used in No. 317, Agr. College,. Aug. 10-16	55.95	.99	2.09	1.60	39.37
" 323	Rape, Aug. 11-16	86.81	.41	2.24	1.47	9.07

Rape even as early as August contains as large a per-.. centage of proteid as the legumes and according to the Journal of Agricultural Research is capable of being ensiled, especially with legumes. The value of this plant as ensilage for this climate is worthy of further study.

A number of analysis as checks on feeding experiments at the College barn have been made.

Section 6. This department is co-operating with the Provincial Entomologist in testing the sticking qualities of various insecticides. There is at present under analysis a number of samples of leaves and fruit which have been sprayed with various arsenical poisons.

Section 7. The publicity given to the use of limestone has led many to investigate deposits which might be of value agriculturally. Among these, many samples of limestone including the marls have been submitted for analysis.

Marl is an earthly material composed of clay and broken up limestone. Deposits of this material are found in eastern Nova Scotia and Cape Breton. The value of any deposit depends upon the percentage of limestone which may vary from 4% to 92%. A marl with only 4% of limestone is an ordinary soil with a good supply of carbonate of lime or limestone to keep itself in good condition; with 75% the marl might profitably be transported some distance rather than buy the machine crushed limestone at the prevailing price.

A marl, when put into a tumbler with some vinegar, will cause a bubbling. Anyone who knows of any such deposit should try this simple test on the material. In order to get the exact amount of limestone present in the material send a sample, about half a pint taken from different parts of the deposit, to the chemist, Agricultural College, for analysis.

Throughout the length of the Stewiacke and Shubenacadie Valley and the upper half of the Musquodoboit there is abundance of carboniferous high grade limestones. This fact with the prospect of a portable crusher operating in this area led to the analysis of 17 samples from the Stewiacke Valley and 14 from Musquodoboit. These were obtained from deposits quite widely separated. The minimum of carbonate of lime was 75% and the maximum 98.1% the average about 95%.

As the Musquodoboit Valley is followed down, the carbonate of lime is partially replaced by the carbonate of magnesia, so that at Middle Musquodoboit the samples had 57% of carbonate of lime and 35% of carbonate of magnesia Since these substances are equally effective in sweetening the soil the Musquodoboit limestone may be classed as high-grade for soil improvement, but poor for the manufacture of burnt lime.

From Windsor east, Nova Scotia is abundantly supplied with limestone either as rock or in marl condition running even as high as 100% carbonate of lime in a deposit at Red Island, Richmond County. Since the value of ground limestone in aiding the growth of legumes and so cheaply increasing soil fertility, in eradicating club-root on the roots of the crucifers has been fully demonstrated in other countries and fairly well in Nova Scotia it well may be considered one of the resources of the province from the standpoint of the farmer.

There remains to be demonstrated whether or not the crushed stone can be put on the market at the low figure at which it is obtained in some parts of the United States. With the price of machines, which will give a bigger yield per hour, with expense of quarrying and grinding made as low as possible, more farmers may be induced to use larger quantities.

The present price landed on the farm at Truro is about $4.50 per ton. Assuming this to be applied in the fall at the rate of 4 tons per acre to land infected with club-root the cost would be $18.00 per acre. In a 5-year rotation, from experiments on the College farm and elsewhere, limestone may be expected to give the following increases per acre.

1st. year	100 bushels of turnips at 7c per bus.	$7.00
2nd. "	oats, seeded to timothy and clover, no gain except in catch of clover	
3rd. "	1 ton of hay largely clover	10.00
4th. "	½ " " " "	4.00
5th. "	oats, peas and vetch, 2 tons	5.00
	Total	$26.00

The limestone in this rotation gives a gain of $8.00. It is quite possible that with more general use of limestone the price may be reduced by one half, so that the gain would be $17.00.

In addition to this there will still be some lime in the soil for the benefit of the next rotation so that in future only one or at the most two tons of limestone every five years will keep the soil in good condition. The deposit best suited for the production of the cheap ground stone must have high percentage of carbonate of lime, be easily quarried and cheaply shipped by rail or water.

The Agricultural College will analyze, free of charge, any samples of limestone which may be sent.

Section 8. *Analysis of Soils.* This work has been continued during the year. An effort was made to study quite carefully the soils of certain sections. On the request of the department of Industries and Immigration I visited and collected samples from Maitland and Selma, Hants Co., Pugwash and Wallace, Cum. Co. and the Sackville Valley, Halifax Co. The results of these studies are included in pages 140, 143, 146. Tables I, II and IV. A group of soils from Merigomish, Pictou Co. is dealt with in Table III Analysis from scattered parts of the province are considered on page 149 to 153.

HANTS CO. TABLE I.

No.	PLACE	Nitrogen	Phosphoric Acid	Potash	Lime	Magnesia	Water in air dried soil.	Volatile matter mostly organic.	Insoluble Silica	Soda	Iron oxide and alumina	Humus
70	Selma, marsh..........	.23	.46	.85	.72	1.47	3.75	9.50	72.50	.291	10.45	....
71	"	.185	.348	.347	.54	.619	1.90	7.60	81.89	.130	7.09	....
72	Maitland..............	....	.46	.299	.54	.47	1.85	8.15	81.95	.210	6.63	....
73	Selma.................	.18	.403	.231	.63	.392	1.75	6.00	85.95	.185	3.81	....
74	"	.167	.174	.386	.454	.818	2.50	6.50	80.36	.079	8.45	....
75	" upland..........	.144	.348	.328	.363	.457	2.60	6.30	82.59	.079	7.09	....
76	Maitland muck........	.82	.640	.098	1.8	.46	6.25	38.350	48.40	.101	3.50	....
77	Selma.................	.1	.570	.463	1.2	1.04	2.35	10.90	75.10	.112	10.1	....
78	Maitland..............	.15	.320	.221	.4	.46	1.85	6.3	84.20	.106	6.5	2.1
79	"	.15	.512	.015	.8	.54	1.8	6.30	84.55	.159	6.0	....
80	Selma upland.........	.19	.44	.041	.7	.68	1.50	6.25	83.93	.610	7.6	....
81	"	.122	.32	.018	.8	1.62	3.60	6.40	73.93	.212	11.7	....
82	" subsoil.........	....	.160	.397	.6	.20	.850	4.50	84.70	.079	9.3	....
83	" subsoil.........	....	.128	.150	.2	.460	1.150	4.37	86.50	.238	6.4	1.05
85	Maitland muck..	....	.510	.126	2.50	.792	12.90	64.15	17.30	.132	2.3	....

Table I gives the results of analysis of soils from Hants Co. This area belongs to the Devonian sandstone and shales, the Carboniferous sandstone and shales with limestones around Maitland and Selma and the Triassic sandstone along the Bay shore near Noel.

Naturally the decomposition of such a variety of rock will give much variation in soil, as shown by physical analysis as follows:

No.	70	73	75	77	78	80	81
Fine gravel	....	2.20	1.65	8.80	3.3	3.5	3.9
Coarse sand	....	4.	4.10	8.40	6.05	7.75	7.55
Med. sand	2.2	9.8	7.13	7.20	7.5	10.70	10.45
Fine sand	7.1	38.9	25.4	13.8	29.8	19.75	20.1
Very fine sand	29.7	25.3	33.8	22.1	37.2	32.	33.4
Silt	40.2	11.6	16.7	20.3	15.3	14.70	14.7
Clay	20.8	8.2	11.2	19.4	.85	11.6	9.9

No. 70 is a cultivated marsh at Selma. Such soils are characterized by high clay and silt content giving them their value for hay and grain.

No. 73 is from Mr. Swan's farm, Selma. It is an uncultivated upland sandy soil, with deposits of limestone nearby. This is a typical Triassic sandstone soil.

No. 78 is a poor sandy soil on a hill farm at Maitland. 75, 80, 81 are cultivated Triassic soils some distance from limestone. There is less lime in 73 near limestone than in these three. Such soils are light and are admirably suited for potato growing and truck farming. 77 is a virgin soil resulting from the decomposition of carboniferous conglomerate; note the amount of lime in Table I and of clay in the above table.

Referring to Table I, chemically these soils, except the muck soils 76 and 85, and the marsh soil No. 70 have a low percentage of nitrogen.

The soils are above the average of the province in phosphoric acid and lime yet they are somewhat acid requiring about 2 tons of limestone per acre to correct the acid.

That potash is usually deficient in sandy soils is shown in this set, the largest amount, .85% is found in the marsh soil which is made up, to a certain extent, of materials worn away from rocks of the Cobequids and North Mountains, washed to this shore and deposited in the bays. On the whole, such soils especially need barn-yard manure or green manuring to increase the nitrogen and organic matter.

TABLE II. WALLACE, CUMB. CO.

No.	PLACE	Nitrogen	Phosphoric Acid	Potash	Lime	Magnesia	Water in air dried soil.	Volatile matter mostly organic.	Insoluble Silica	Soda	Iron oxide and alumina	Humus
88	Wallace Bay............	.17	....	.184	.6	.54	......	......	......	.185	6.25	....
89	"	1.56	.288	.678	Trace	.576	6.5	40.0	44.28	.954	7.2	....
90	"	.16	.064	.291	.3	.61	.90	6.85	86.87	.238	5.83	....
91	"	.13	....	.174	.4	.54	.95	6.90	87.18	....	3.6	1.25
93	"	.16	.096	.271	.2	.64	1.00	7.5	84.95	.107	5.4	1.3
94	"	.06	.192	.194	.05	.82	.25	4.25	87.38	.212	6.5	....
95	"	.17	.064	.339	.3	.79	3.00	6.4	83.35	.212	6.2	....
96	"	.05	.192	.242	.4	.75	.45	3.05	87.37	.318	7.0	....
97	Pugwash..............	....	.096	.669	.1	.72	1.1	3.90	81.6	.185	10.7	....
98	"	.07	.192	.63	1.30	.61	2.5	5.95	79.3	.185	8.4	....
99	"	.112	trace	.339	.9	.....	1.5	6.05	82.04	.159	6.2	....

Table II deals with soils from Pugwash and the head of Wallace Bay. The rock of this section consists of Permian sandstone and shales. The soils are strongly acid and have so large a percentage of fine material as to be characterized as heavy soils. About 15% clay, 25% silt and 40% fine sand make up the greater part of these soils. Most of the samples analyzed are from farms once very productive but now run out and being brought under cultivation. They are all upland soils except No. 89 which is a marsh growing salt water grasses and containing a good amount of potash, phosphoric acid and nitrogen, the latter being largely unavailable because bacteria, on account of excess of water and lack of lime, are not able to live and cause the dead grass, etc. to decay. Pugwash soils have a higher percentage of clay and therefore the total potash is higher than in soils farther east. Surface soils such as 93 and 95, and the corresponding subsoils 94 and 96, are very poor soils so far as chemical analysis may indicate. The few samples taken as a rule from worn out farms point out the need of a general building up of the soil by the use of green manures, stable manures, phosphates and lime, the last of which is found in several localities. Sample No. 98 is taken from a field overlying a bed of good limestone.

Limestone is found in the Permian sandstones, but as the rocks decayed, the limestone largely washed away leaving soil quite strongly acid and with a percentage of limestone as low as .1% while a rich soil should have 1%. The acidity of the soils varies a great deal, 1 ton per acre in some cases destroying the acid, but others as high as 5½ tons of carbonate per acre is needed.

TABLE III. PICTOU CO.

No.	PLACE	Nitrogen	Phosphoric Acid	Potash	Lime	Magnesia	Water in air dried soil.	Volatile matter mostly organic.	Insoluble Silica	Soda	Iron oxide and alumina	Humus
143	Avondale.............	.155	.064	.43	.2	.86	1.00	6.50	80.78	.16	10.2	1.45
145	Merigomish...........	.14	.05	.23	.22	.24	1.85	5.5	84.6	.09	6.4	....
146	"	.137	.13	.291	.3	.65	1.05	5.45	85.02	.16	6.7	....
149	"	.15	.064	.36	.1	.684	*6.85		83.41	.265	7.8	....
153	"	.18	.096	.24	.5	.5	*7.55		86.22	.125	7.0	2.45
154	"	.125	.13	.184	.3	.47	*6.05		86.14	.05	6.8	....
155	"	.165	.096	.35	.3	1.	1.9	6.85	80.12	.265	8.00	....
157	"	.15	.19	.38	.3	.54	*7.25		82.54	.1	8.2	....

*Water and organic matter together.

No part of the province has a more diversified rock formation than Pictou Co. In the west there are the Permian sandstones and shales; through the middle from north east to south west runs a strip of older sandstones and shales with some limestone deposit. East of this are still older deposits of conglomerate shale and slates bordered on the south by Devonian shales and igneous rock.

When the residues of such a variety of rock are mixed in varying proportions as they are in the river valleys and the marshes there is naturally a great variety of soils. A few samples of soils obtained near Merigomish and one from Avondale have been analyzed with results as shown in Table III. The failure of clover in many cases, the litmus test and the low percentage of lime present all indicate a general acid condition in these soils. The limestone required to destroy this acid is about three tons per acre.

The continual cropping with hay and grains has brought the quantity of phosphoric acid to a minimum so that, as in No. 153 there was only one ton of hay per acre after being four years in hay. The amount of nitrogen is about fair, while the total potash is rather low for good soils. Soils with more clay are found towards the Avondale section.

The lack of organic matter, phosphoric acid and available potash in this group are the notable features and suggest the same treatment as that urged for much the same type of soils in the Wallace area.

TABLE IV.

No.	PLACE	Nitrogen	Phosphoric Acid	Potash	Lime	Magnesia	Water in air dried soil.	Volatile matter mostly organic.	Insoluble Silica	Soda	Iron oxide and alumina	Humus
336	Upper Sackville.......	.27	.1	.2	.3	.93	5.5	9.95	74.89	.15	8.2	....
338	"	.25	trace	.18	.15	.72	3.25	10.75	75.99	.1	8.2	....
339	"	.2	.1	.18	.1	.86	1.7	7.15	79.93	.13	.13	....
341	"	.4	.16	.16	.35	1.11	3.25	14.45	71.75	.10	8.2	....
344	Sackville.............	.15	.1	.2	.4	.5	1.05	5.1	87.06	.04	5.9	....
345	Lower Sackville.......	.17	.06	.12	.2	.43	.85	5.	89.57	.08	4.	....
346	"	.12	.03	.14	.2	.21	.8	4.4	91.47	.14	3.3	....

The valley of the Sackville River is narrowest at the mouth. For a distance of about 10 miles to Lewis Lake, it keeps widening out dividing into the main river valley and the little Sackville River valley, with a high ridge between the two valleys. Since several ridges cross the direction of the main valley, the surface of this section of the country is quite irregular, with no level areas to any extent.

Naturally there is good surface drainage, and on account of the dip of the rock, which often is quite near the surface, there is no need of underdrainage. This probably accounts for the fact that alfalfa, on one farm at least, flourishes, making a good strong root, and wintering in good condition.

Geologically, the rock in this area is of the Cambrian age, being the whin, at Bedford and the head of the valley, but crossed for four miles at Middle and Upper Sackville, by slate rock, which is quite near the surface in many places. The soil, very shallow at the entrance of the valley, becoming deeper as the valley widens, is quite uniform in appearance and composition. Most of the soil which is of glacial origin is about 10% gravel, 70% coarse and fine sand, 10% silt, and a little clay, with 5% organic matter.

The physical composition makes this soil well suited for truck farming, and the growing of small fruits. The absence of clay is not favorable to the growth of grasses or grains.

The soils are acid, some markedly so. Twelve samples taken at intervals from Lewis Lake to Lower Sackville, were tested for soil acidity, and found to require from four to seven tons of limestone per acre to correct this condition. This is quite natural, since the absence of limestone rock in this formation, the continued leaching, the use of commercial fertilizers and the decay of organic matter all tend to increase the sourness of the soil.

Seven of the soils taken were fully analyzed. The seven in Table IV show the chemical composition of the soil of this valley.

Except in the case of the low, more or less swampy area, there is a marked deficiency in organic matter, or humus which supplies part of the soil's nitrogen. This is especially noticeable in soils in the lower end of the valley. The total plant food, while less than that in Nova Scotia soils, is, in the Davis and Kerr soils, per acre, to the depth of 6″ phosphoric acid, 2000 lbs. and 1200 lbs. respectively, potash 3600 and 2400 lbs. These are large amounts considering the quantity required for the average crop. Without the presence of organic matter, these amounts are not available to any extent for many crops.

While the ualley is not adapted for growing large crops of hay, yet the proximity to Halifax will favor dairy work, which in turn will give stable manure, which these soils need so much. For the encouragement of clover, more soluble phosphoric acid and ground limestone should be used. With the decay of the stable manure or clover residue, the necessary amounts of potash may be set free.

In conclusion we may say that conditions in the Sackville valley favor dairy work and market gardening.

TABLE V

No.	Nitrogen	Phosphoric Acid	Potash	Lime	Magnisia	Water in air dried soil.	Volatile matter mostly organic.	Insoluble	Soda	Iron oxide and alumina	Humus	Lime requirement. Tons per acre of carbonate of lime.
125........	.12	.19	.32	.70	.....	1.25	5.15	85.27	.079	7.10	......	2.5
128........	.19	.10	.37	.6	.47	.....	......	87.94	.16	6.8	......	1.4
129........	.19	.13	.18	.2	.32	.75	6.10	85.84	.16	4.8	......	2.0
161........	.18	.10	.13	.15	.58	.75	8.30	85.07	.04	6.1	2.8	4.2
164........	.34	.16	.91	.3	.61	1.35	14.80	70.23	.24	12.2	4.45	5.0
165........	.20	.10	.23	.1	.72	1.95	10.55	74.79	.24	10.1	4.10	5.0
185........	.18	.29	.45	.1	1.04	1.25	8.85	74.10	.29	14.	2.50	6.7
186........	.08	.06	.24	.1	.54	1.50	14.10	74.77	.24	10.5	5.20	6.0
187........	.12	.06	.38	.4	.72	1.00	4.25	86.87	.20	6.2	1.35	2.2
215........	.10	.29	.18	.15	.29	2.60	9.30	74.02	.12	11.4	5.05	6.0
216........	.23	.06	.11	.1	.11	.30	4.35	90.17	.15	4.2	......	3.8
217........	.18	.06	.37	.5	.86	.85	8.55	75.41	.19	8.6	2.20	4.1
219........	.13	.06	.50	.1	.47	1.85	10.60	78.73	.27	10.	2.25	6.7
223........	.24	.09	.45	.2	.72	2.10	10.75	70.84	.23	12.9	......	5.5
224........	.10	.12	.30	.2	.79	.95	6.35	78.39	.05	12.7	......	3.9
225........	.16	.13	.52	.1	.72	.85	9.15	74.72	.28	12.3	2.40	4.1
230........	.70	.14	.31	1.	.50	6.95	21.85	62.24	.16	8.4	7.40	3.8
234........	.21	.10	.39	.3	.79	1.75	10.00	76.03	.32	10.50	2.65	3.45
237........	.24	.10	.19	.1	.36	1.30	8.80	86.79	.10	4.9	......	1.7

TABLE V.—(*Continued*).

No.	Nitrogen	Phosphoric Acid	Potash	Lime	Magnesia	Water in air dried soil	Volatile matter mostly organic	Insoluble	Soda	Iron Oxide and alumina	Humus	Lime Requirement. Tons per acre of carbonate of lime.
238........	.10	.....	.....	.....	.....	.60	4.65	....	.....	....	1.50	2.3
239........	.15	.16	.21	.15	.36	1.55	6.25	88.92	.09	6.6	......	2.8
241........	.34	.19	.26	.25	.72	2.	15.65	71.87	.20	10.3	......	7.2
262........	.43	.10	.13	.20	.76	2.25	14.00	74.52	.13	8.4	4.50	3.5
285........	.19	.10	.32	.10	.22	1.1	7.30	83.82	.29	7.8	2.50	......
287........	.07	.25	.20	.05	.07	5.45	15.70	77.59	.15	7.1	......	......
293........	.26	.19	.11	.30	.27	3.45	9.80	75.28	.40	10.	3.20	3.5
301........	.32	.19	.27	.20	.10	3.40	12.30	70.77	.48	11.9	......	4.5

EXPLANATION OF TABLE V

125 Reg. North, North's Corner, Kings Co. Light red sandy stone soil with additions from hillsides of the North Mt.
128 A. J. Walker, Truro, Virgin soil; clover fails; needs drainage; grass fair
129 A. J. Walker, Truro, Cultivated, slag in 1914. Oats good.
161 Alex. Anderson, Baddeck.
164 D. A. Wood, Eden Lake, Pictou Co. Cultivated 20 yrs; ploughed 3 years ago; poor wheat and hay; little stable manure; poor clover.
165 *M*. Robicheau, Meteghan, Dig. Co. Old field lately ploughed; no fertilizer added.
185 E. F. Wright, Lr. Stewiacke, Col. Co. No information sent.
186 Gordon Lewis, Cen. Chebogue, Yar. Co. Loose sandy soil with gravel subsoil.
187 S. Faulkner, Princeport, Col. Co. Heavy soil; used barnyard manure and 800 lbs. potato phosphate 1913; slag in 1915.
215 J. C. Tory, Guysboro, New land; red sandy soil.
216 J. C. Tory, Guysboro, New land; white sandy soil.
217 J. A. McAdam, Eskasoni, C. B. No information.
219 J. C. Stewart, River John, Pic. Co. Rather heavy soil; cultivated.
223 J. E. Petri, Sydney, C. B. Upland.
224 J. E. Petri, Sydney C. B., upland subsoil.
225 J. E. Petri, Sydney, C. B. Cultivated land in a valley.
230 F. T. Gammel, Newton Mills, Col. Co. River Intervale. Applied ground bone and manure.
234 Allan McNeil, Shenacadie, C. B. In pasture 20 yrs; sandy soil; no fertilizer used; oats very poor.
237 E. B. Faulkner, East Mines, Col. Co. Heavy soil; clover does fairly well; slag used.
238 E. B. Faulkner, East Mines, Col. Co. Fine white sandy soil.
239 E. B. Faulkner, East Mines, Col. Co. In 1913 used 10% potato phosphate. Good clover in 1915.
241 Wm. Lavangie, Harbor au Bouche, Ant. Co. Sandy soil; cultivated.
262 J. E. D'Eon, Meteghan Dig. Co. No information.
285 F. L. Creelman, South Branch, Col. Co.
287 D. Robicheau, Meteghan. Supposed to contain much potash. Largely diatomaceous earth.
293 R. H. Morrison, Roberta, C. B. In hay many years; many weeds, as sorrel.
301 J. H. Fancy, Kempt, Queens Co. Clover grows well. Light soil well cultivated.

TABLE NO. VI.

No.	Nitrogen	Phosphoric acid	Potash	Lime	Magnesia	Water in air dried soil	Volatile matter mostly organic	Insoluble	Iron oxide & alumina	Tons of carbonate of lime needed per acre
362	.37	.47	.57	.3	1.26	4.60	17.50	61.29	11.43	7.6
365	.24	.13	.2	.2	.22	4.50	9.05	74.74	9.67	2.9
368	.16	.15	.28	.3	.29	6.35	9.25	72.87	9.35	2.9
369	.13	.03	.08	.05	.07	1.65	8.75	83.56	6.47	5.3
370	.28	.06	.13	.6	.29	1.80	11.70	79.43	6.14	1.8
371	.23	.06	.13	.1	.25	2.10	4.50	80.33	9.84	3.5
372	.33	.13	.10	.1	.68	5.90	12.20	66.88	13.17	5.7
373	.24	.09	.3	.05	.22	3.70	9.90	74.84	10.10	4.25

EXPLANATION OF TABLE VI.

362 H. R. Des Barres, Guysboro. Pasture for 10 years. No fertilizer.
365 W. Rhodeniser, Northfield, Lun. Co. Under good cultivation; 70 bushels oats per acre; 20 tons of manure; 1000 lbs. mixed fertilizer.
368 Jas. Mader, Pine Grove, Lun. Co. Wheat 22 bushels per acre.
369 Jas. Harlow, Sable River, Shel. Co. New land; sandy and loose, poor clover.
370 Jas. Harlow, Sable River, Shel. Co. Orchard; long under cultivation.
371 J. W. Smith, So. Brookfield. New land deposited by river.
372 J. W. Smith, So. Brookfield. Same but reclaimed and ploughed for first time.
373 Scott Hebb, Hebbville, Lun. Co. Oats failed; club-root bad.

Our policy is for the chemist himself to gather samples and to obtain in the field and in the laboratory information that will lead one to estimate the amount of dormant plant food in the soil of various areas. Such has been attempted in tables 1-4. This is one of the features of a soil survey which in time may cover the whole province. In Tables V and VI are gathered together the analyses of a number of soils which have been sent by individuals from many parts of Nova Scotia. Samples as a rule were taken according to directions.

From the figures under the first four headings we get an average as follows:

Nitrogen, .19% omitting no. 230.
Phosphoric acid. .13%.
Potash .3%.
Lime .26% omitting no. 125, 128, 230.

By referring to the plant food requirements on page 155 one can form a rough estimate of the fertility of a given soil.

The work in Soil Analysis will be carried on during 1917 but with more attention to areas. Samples sent in by individuals must be taken according to directions sent out from the College in circular number 24.

After the analysis is made, the following circular, number 25 is sent out.

Explanation of Soil Analysis.

What is analysis? In an analysis, any material is divided into different parts, for example the potato into water and starch; gold ore into gold and quartz. Since soil is the refuse from the breaking up of all sorts of rocks, and from the decay of plant and animal matter, it is composed of many substances. For this reason, as well as the fact that some of the important substances, from the standpoint of plant food, are found in relatively small quantities, soil analysis is rather complicated.

As a rule, the greater the variety of materials making up a soil, the richer is that soil in plant food. By continued leaching and surface washing, the fine earth and the soluble part, the most valuable portion of the soil, may be carried away, leaving only sand, which may, or may not have plant food in it.

When a full analysis is deemed necessary, the following points are determined:

1. The litmus test shows the soil to be sour or not.

2. If sour, how much ground limestone per acre is needed to sweeten the soil.

3. Finding, by shaking the soil through sieves of various sizes, the amounts of gravel, coarse sand, medium sand, fine sand, silt, clay.

This analysis not only gives some idea of the plant food in the soil, but also the power of that soil to hold water and plant food which may be applied to it. The following facts indicate the use of this analysis:

Silt and clay contain quite a large percentage of lime and potash, most of which is unavailable. Gravel and sand are mostly useless silica. A good soil should have 12% of clay, but a soil with 50% is a heavy one. A potato soil should have 60% of medium and fine sand, and 15% clay. Grass and grain soil, 50% to 70% silt, 12% clay.

4. Chemical tests:

A.—The soil is dried to get the percentage of water held.

B. Burned to find the amount of *organic matter* which passes off, and the mineral matter which remains. The organic matter is usually 3.% *nitrogen* which is usually all the nitrogen in the soil. When this organic matter is well decayed, it is known as humus, the nitrogen of which is available. On the basis of the amount of organic matter, the soil may be a black swamp soil, with as high as 98% of organic matter; this is often a poor soil because it lacks potash and lime. Or it may be a light colored soil, with little or no organic matter. This also is a poor soil because it lacks nitrogen and phosphoric acid. Again it may be a good soil with about 8.% to 15.% of organic matter, which helps to hold the water and plant food.

C. Heated with strong acid to give two parts, the insoluble or useless part, and the soluble part, which contains the following:

Phosphoric Acid
Potash
Lime
Magnesia
Soda
Sulphuric Acid
Iron Oxide
Alumina

While all these parts make up the soil, only those in italics on account of the small quantities in the soil, or their not being soluble, have to be applied as fertilizers.

The farmer and the plant are in partnership as manufacturers. Chemical analysis shows that there is .5% potash, .2% phosphoric acid and .2% nitrogen in the average soil of Nova Scotia, or in other words, 10,000 pounds of potash, 4000 pounds of phosphoric acid and 4000 pounds of nitrogen in the first seven inches of every acre of soil. This is the inventory of plant food. Since our soils are not poor the farmer's problem is not to make something out of nothing, that is, a good crop out of a barren soil, but to make use of any agency that will dissolve about 50 pounds of potash out of 10,000 pounds per acre. The farmer who wishes to get 45 bushels of oats per acre containing 78 pounds of potash, is advised to consider that by rotation, cultivation, decay of organic matter, as manure, clover, etc., he can set free sufficient of his store of 10,000 pounds of potash to supply the crop.

Since other factors than the amount of any element found in the soil make for fertility, it is impossible to state any definite per cent of plant food necessary.

The following as shown by acid solution are approximate total requirements:

Table VII.

Substance	For a good soil there should dissolve in acid.	of this there should be available.
Nitrogen	.2%	2.%
Potash	.3%	½ of 1%
Phosphoric acid	.1%	1%
Lime	.5%	Soil should not as a rule be acid.
Organic matter	7.0%	

The plant food in 2,000,000 lbs. the weight of the top 6 inches of 1 acre of several soils of Table V is given in Table VIII.

Following the totals in each soil is given the approximate amount of plant food made available by ordinary cultivation

Table VIII.

	Nitrogen	Phos. Acid	Potash	Lime
Kings Co	2240	3840	6400	14000
Available	45	38	16	.....
Pictou Co	6840	3200	18200	6000
Available	137	33	45	.....
Cape Breton	4200	2000	7800	6000
Available	84	20	19	.....
Queens Co	6400	3800	5400	4000
Available	128	38	14	.....
Yarmouth Co	1620	1280	4800	2000
Available	32	13	12	.....

In order to give some idea of the relation between the available soil plant food and that which may be needed from manures or fertilizers the following demands by certain crops are given:

	Nitrogen	Phos. Acid	Potash	Lime
Timothy 2 tons per acre.	50	20	60	..
Turnips 700 bu	80	52	180	..
Wheat, 30 bu	62	20	26	1½
Clover, 2 tons	80	10	60	45

To sum up, the average soil of Nova Scotia needs 3 tons of limestone to destroy the acid which is usually present. It needs stable manure, clover, etc. plowed in, to increase the organic matter, which is needed for holding water and for setting free potash. It contains much potash which may be set free by decaying organic matter. It needs the application of phosphoric acid, in some available form.

For further information on the soils of Nova Scotia, consult the Report of the Secretary for Agriculture, for 1915, page 22. Or if you wish definite information, about soil of your locality, or farm, write L. C. Harlow, Agricultural College.

TABLE IX. ANALYSIS OF BLACK SOILS

No.	Name	Locality	Water	Org. Matter	Nitrogen	Phosphoric Acid	Lime	Potash	Insoluble matter
325	Fred Atwater..........	Boylston, Guysboro Co...	25.75	45.55	1.42	.60	....	...	19.40
330	Martin Innis...........	Pictou..................	9.67	85.61	.94	.20	.30	...	3.07
354	R. K. Morrison.........	Groves Pt., Victoria Co...	27.25	59.90	1.50	.32	....	...	7.30
290	N. Cruikshank..........	Elderbank, Halifax Co.....	15.60	77.25	2.06	.29	.05	.12	4.87
299	A. J. Campbell.........	Beatonville, Inverness Co..	13.10	63.15	1.62	.48	3.80	.19	10.72
300	*M*. J. Morrison..........	Black Rock, Inverness Co.	15.25	72.70	1.60	.16	1.30	.07	7.94
131	P. E. Ogilvie............	McKay's Cor., Cape Breton	95.00		.65	....	....	...	.....
132	P. E. Ogilvie............	McKay's Cor., Cape Breton	99.00		.91	....	....	...	.....
163	A. H. McIsaac..........	Caledonin Mills, Ant. Co...	43.45		.77	....	....	...	.....
233	Robt. Densmore.........	Blue Mt., Pictou Co......	98.40		1.25	....	....	...	.....
242	P. J. Shaw.............	Aylesford, Kings Co......	4.10	64.05	.54	.03	.20	.07	30.82
162	J. E. Petri..............	Sydney, Cape Breton.....	51.85		1.30	.06	.25	.24	40.46
121	A. McKinnon...........	Inverness................	6.25	7.65	.06	.26	1.40	.66	65.55
214	J. C. Tory.............	Guysboro................	7.00	24.90	.70	.22	.55	.32	58.29
326	Fred Atwater...........	Boylston, Guysboro.......	5.60	11.70	.37	.40	....	...	71.80
*293	R. H. Morrison.........	Roberta, Cape Breton.....	3.45	9.80	.26	.19	.30	.11	75.28
*344	John Flemming.........	Sackville, Halifax.........	1.05	5.10	.15	.10	.40	.20	87.06

*The two analysis are of mineral soils given here for sake of comparison with the black soils.

The Black Soils of Nova Scotia.

We have scattered through this province many tracts of swampy, boggy, meadow land which at best grow nothing but sedges, rushes, and such coarse grasses as "blue-joint". Some of these tracts are of considerable extent, others cover only a few acres or the fraction of an acre. But be it large or small almost every farm has its patch of swamp or meadow land and the farmer is often at a loss to know how to use this area to good advantage.

The general nature of the soil in such areas is almost too well known to need mention. It differs from ordinary soils in being very much darker in color, lighter in weight, and containing a high percentage of decayed or partially decayed vegetable matter. But, as in all other natural deposits, we find great variations in this type of soil, from the true peaty soil which may contain 75% or more of vegetable matter, down to the muck or silt deposit which may contain only 10% or even less of vegetable substances.

The depth of the deposit and the nature of the subsoil also vary Sometimes it will only be a few inches down to the subsoil, and again it may be three feet or more. The subsoil or underlying strata may be the natural rock formation of the locality, or it may be a quicksand, or a sticky drab or blue clay; more frequently it is the last mentioned.

The common characteristic of all these areas is the lack of proper drainage. In some cases they are under water practically all the year round; in others, a team can get on them only during the growing season and will only grow coarse hay. Very often this state of affairs can be remedied by a few hours' or days' work deepening an outlet and some judicious surface ditching, and the area can then be brought under cultivation.

Before outlying any method of treatment for reclaiming them a glance at the accompanying table will show the general nature of such soils.

The first ten are typical peat soils such as occur in the average swamp or bog. They are characterized by a very high percentage of organic or vegetable matter and a low content of mineral matter, the substance which makes up by far the largest part of our ordinary soils.

Numbers 242, 162, 121, and 214 can be more properly characterized as true muck soils. They also are high in organic matter but much lower than the peaty soils already mentioned and with a much larger amount of mineral constituents. No. 121 is the nearest approach to a mineral soil in the lot. No. 326 is a salt-water deposit, a "mussel-mud."

All are characterized by high water content, which of course is due to the great water-holding capacity of such deposits. They absorb water like a sponge.

The last two analysis given in the table, Nos. 293 and 344, are of typical mineral soils and are simply given here for the sake of contrasting the analysis of the black soils with them. Note the much lower content of water and organic matter than in the black soils, also the *much higher percentage* of insoluble matter.

Considering the analysis of the black soils more in detail and from the standpoint of the four essential elements, viz:

Nitrogen, Phosphoric Acid, Lime, and Potash.

1. *Nitrogen* (*N.*) It will be noticed that these soils excepting No. 121 have an unusually high percentage of nitrogen, from 1 to 2%. This is directly due to the high content of organic or vegetable substance. Our average soils contain only about two-tenths of one per cent. It does not follow however, that all this (1 to 2%) can be made use of by the growing plants. It is largely locked up in the organic compounds which form the peat, and the rate and extent of its availability as plant food will depend on the stage of decay which the vegetable matter has reached.

2. *Phosphoric Acid.* (P_2O_5). Nos. 325, 354, 299 and 326 are very high in phosphoric acid. Nos. 242 and 162 are below the average. The rest contain a good average percentage of P_2O_5. As the phosphorus is largely an organic combination the same may be said of its degree of availability as has been said in regard to nitrogen.

3. *Lime* (CaO). Nos. 299, 300 and 121 are very high in lime. Nos. 330, 290, 242 and 162 are low.

4. *Potash* (K_2O). Of the true peaty soils in which potash was determined (Nos. 290, 299 and 300) all are deficient in that element. This is a point to be borne in mind as it is a general characteristic of such soils and treatment of these is based largely upon it. Nos. 162 and 214 are fairly rich in potash. No. 121 is very high, and it has already been pointed out that it is the nearest approach to a mineral soil of all.

To sum up; generally speaking such soils have *sufficient nitrogen and phosphoric acid*, though it is not always readily available; occasionally they are rich in lime but more frequently deficient; they are practically always *poor* in *potash.*

Bearing these facts in mind how may they be more productive? Our best authorities on the subject advocate strongly the use of barnyard manure and potash fertilizers along with it. The application of manure inoculates the soil with decay-producing organisms which render the nitrogen and phosphoric acid more available by breaking up the complex substances which hold them in combination. Since the soils are low in potash it must be supplied in some available form.

Such measures may be adopted to get crops started on these soils but if nothing further is done we very often find the soils "running out" after two or three crops have been taken off. This is due to lack of mineral constituents and if the subsoil be of a nature to permit it, is best overcome by plowing deep, thus bring the underlying strata to the surface and mixing it with the peaty surface soil. If such a practice be adopted the area in question will be found becoming more productive each year till maximum production is reached.

All this is of course based on the assumption that such areas can be drained and made workable. Where they cannot be, of course such treatment is out of the question. Under such conditions the black deposits can best be used in the stable as absorbents for liquid manure. The black peaty substance is usually a splendid absorbent and when well mixed with the manure decays rapidly anff adds its own manurial value to the manure as well as that of the liquid manure saved. This is an important point as the liquid portions are the most valuable part of the manure, containing about two-thirds of the total plant food in it.

This is much better practice than to simply apply the peat or muck in a raw state to the land. It can be hauled from the bog or swamp during slack times and piled up to dry. It should not be used in the stables wet as then its absorbing power is very much lessened. Gypsum or land plaster can be used to advantage with it.

There are then three main points to be considered in reclaiming such soils.

I. Drainage (If possible).
II. A liberal supply of potash on the start.
III. Subsoiling.

Section 10. Lime Requirement of Soils: 1.—Whether or not a soil is sour is determined by a simple test with litmus. In almost every case the acid condition is shown in the soils tested. Lime in some form destroys this acid which must be used up before clover and other legumes can flourish. The varying amount of acid in soils calls for a variation in the amount of burnt lime or carbonate of lime used per acre.

Experiments with ground limestone were started in the spring of 1916 in Yarmouth, Queens and Lunenburg counties; the area experimented with was sown to oats, wheat or barley, and seeded down with timothy and clover. One half of the plot was treated with limestone at the rate of 3 and 4 tons per acre; the other half was left unlimed; both plots were treated alike in all other respects.

The first thing done was to ascertain the number of tons of limestone, 90% pure, that each soil needed to correct the acidity.

The limestone experimental plots are located as follows:

Kempt, Queens Co., and vicinity	12	plots
Brookfield, Queens Co., and vicinity	9	"
Bridgewater, Lun. Co., and vicinity	13	"
New Germany, Lun. Co., and vicinity	8	"
Yarmouth, and vicinity	13	"

The Plots in Queens and Lunenburg were visited in Oct. 1916, and samples taken for test. In most cases the field work is being carried out carefully and in a year or two some useful information may be obtained from this series of experiments. The following is a summary of results from some of the plots:—

TABLE X.

Yarmouth Co.	Lime requirements		Amt. limestone used per acre	Remarks.
	Spring 1916	Fall 1916		
G. T. Lewis, Yarmouth	6	5.3	3	Barley & clover perceptibly better.
W. Churchill, Yarmouth	3.2	not sent	3	No diff. in wheat or clover
G. M. Spurr, Chegoggin	5.1	4.25	3	No diff. in oats or clover.
W. L. Cook, Salem	5.8	6	3 part on turnips	Clover very much better on limed plot; turnips improv.
Queens Co.				
H. J. Freeman, Kempt	4.2	3.55	2	No. difference in its use.
E. DeLong, Kempt	3.8	1.8	4	Clover good on both plots.
M. W. Freeman, Kempt	3.2	2.7	4	Clover better with limestone
F. Kempton, Kempt	5	3.9	4	Clover better with limestone
E. B. Smith, Caledonia	3.2	2.9	4	Clover good on both plots; soil in good condition.
C. M. Waterman, S. Brookfield	3.2	1.8	4	Clover fair, except results on club-root later.
Lunenburg Co.				
O. Mader, Pine Grove	3.5	3.5	4	4 plots, 2 limed, 2 unlimed; clover best on one of limed plots.
W. Rhodenizer, Northfield	2.9	2.9	4	Limestone helped clover.
A. W. Hebb, Hebbville	5	3.5	4	Better clover.
Scott Hebb, Hebbville	5	3.5	4	Little diff. in favor of lime
C. R. DeLong, Farmington	3.5	2.9	4	No lime had better clover as wheat heavier on limed and clover was killed out.
L. C. DeLong, Barss Cor.	3.9	3.5	4	Clover fair on both.

Lime requirement refers to the number of tons of 90% limestone per acre.

In many cases there is somewhat of a gain for the clover on the limed plots though more definite results may be looked for next year. In some cases the lime requirement test calls for about 4 tons of limestone; after this application the second test still shows very little less lime requirement. This indicates either poor distribution of the limestone, poor sampling of the soil or that a large part of the stone applied is still in the coarse condition not having been acted upon by the acid of the soil.

Part 3. *Experimental.* With much routine analysis and time spent on fitting up the laboratory there has been very little time for special experimental work.

Three series of pot experiments were started in July:—

I. Wheat on red sandy subsoil with 35 variations in fertilizers, natural and artificial.
II. Red clover on sandy loam, previously cropped with vetch; 47 variations in fertilizers.
III. 15 pots of clover on pots with wheat last year.
IV. 25 pots with oats to compare the value of seaweeds, peat, rock phosphate and ground limestone on soils from Queens Co., Guys. Co. and Halifax Co.

We expect to report on this work another year.

In concluding this review of the year's work I beg to thank you, Sir, for the interest shown in the work of this department and for advice which you have been ready to give.

Respectfully submitted,

L. C. HARLOW.

PART 9—WOMEN'S INSTITUTES.

Prof. M. Cumming,
Secretary of Agriculture.

Dear Sir:—I have much pleasure in presenting the Fourth Annual Report of the Women's Institute of Nova Scotia, a report that I feel is very gratifying.

I have not many new Institutes to report for as, you will remember, we decided it would be unwise to launch any large organizing campaign until the war had ceased. Therefore, during the past year, only five Institutes have been added but that in itself has been very encouraging as the five were organized by the request of the women in the five districts, which seems to prove that the influence of the Women's Institutes is being more strongly felt through the Province. Four of the five Institutes were organized in the Stewiacke Valley in February, 1916, and the fifth in Coxheath, C. B. in October. That gives us now forty-nine (49) Institutes, with a total membership of sixteen hundred. The average membership is 32; the highest 80 and the lowest 11. The average number of meetings held by each Institute is 12 and the attendance easily averages two-thirds of the membership.

While the principal effort of the past year has been towards aiding all patriotic work, yet the Institutes have carried out a surprising amount of community work. Along this latter line they have kept up their interests in the Schools, doing much to improve the sanitary conditions and providing help in various ways. School fairs have been encouraged and assisted and the Institute since its organization has carried through successfully a school fair, providing both seeds and prizes for the children. Nearly all the Institutes have done more or less charity work and have fitted out many destitute families with clothes and food. Sewing classes for school girls have been organized and superintended by the Institute members and have been highly successful. Assistance has been given towards town improvement as, the laying of sidewalks, planting of trees and beautifying cemeteries, and installing libraries.

The splendid sum of $8333.12 was raised during the year and I regret, exceedingly, that three of the Institutes have not forwarded reports of the year's work. Of this sum $4654.72 was given to Red Cross; $1899.21 to other patriotic causes as Belgian Relief, Patriotic Fund, and Prisoner's Relief Fund; the remaining $1779.19 was used in buying supplies for Red Cross work and for community work.

The largest sum raised by an individual Institute was $1315.52 by the Weymouth, Digby Co. Institute. Of actual Red Cross work the following is the list: 231 boxes of supplies; 382 jars and 3 barrels of jam; 2745 pairs of socks and 2 boxes of socks of which no count of single pairs was kept, and at Christmas 336parcels were forwarded to the hospitals to gladden the hearts of the soldiers on Christmas morning. Several of the Institutes have adopted one of our prisoners in Germany, who is without friends.

During the year besides the Annual Short Course at Truro, a week's course was given at Lawrencetown, which was splendidly attended and highly successful—the average attendance being over one hundred. Mrs. Hopkins and Miss Redmond gave a series of demonstrations through the Southern and Western counties, a report of which is appended. A series of meetings were held in Guysboro, Antigonish and Cape Breton, addressed by Miss Dutcher and myself which were well attended.

A new departure was the exhibit of home made articles at the Provincial Exhibition, such as hand woven materials and articles of wool and linen and hand made rugs. Two Miss Kaulbachs' of Lunenburg Co, gave a series of demonstrations in weaving and spinning and crowds, each day, found our booth one of the most interesting things of the Fair. Besides the display of home made articles, the Horticultural Dept. aided us by giving a splendid display of vegetables and canned vegetables and we distributed several thousand bulletins on the value of vegetables in the diet and the cooking and canning of vegetables, which was prepared jointly by the Dept. of Horticulture, and the Dept. of Women's Institutes. I must express my indebtedness to the Institute of Lunenburg County, to Kempt, Queen's Co, to Tatamagouche, Colchester Co. and to D'Escousse, C. B. for the most valuable aid they gave me in this undertaking. Especially must I mention the Institute in Lunenburg Co. with their magnificent display of hand woven goods and also Miss McGuire of Lunenburg, who rendered most valuable aid all through the Exhibition. It was an attempt to revive the interest in home weaving, which is almost too valuable an industry to allow to die out without some effort being made to resuscitate it. I feel it was a step in the right direction but that it will require quite an amount of developing. I had the pleasure of judging at the Exhibitions held at Stewiacke, Bridgewater, Caledonia, Sydney, Arichat and Guysboro and in nearly every case, found the display as good, if not better, than before the war. A prize list for the Women's Department was prepared during the winter and was accepted by a number of the Exhibition Commissioners and even after all the work that was given to the preparation of the list, there are still improvements necessary.

I cannot close this report without thanking the various branches in the Dept. of Agriculture for the kindness and unfailing interest they have shown in the work of the Women's Institutes, and to the Secretary of Agriculture for his valuable advice and assistance in every scheme for the advancement of the Women's Institutes that I have laid before him.

JENNIE A. FRASER,
Supt. Women's Institutes for Nova Scotia.

PART II.

Prof. M. Cumming,
Secty for Agriculture,
Truro, N. S.

Sir:—I have the honor to submit my tenth annual report in connection with Agricultural Societies.

Six of the two hundred and forty-seven societies which qualified last year failed to report. Twenty new ones were formed and two resuscitated making a gain of sixteen societies, bringing the total number in line for the present year's grant up to two hundred and sixty-three.

The total membership has increased two hundred and eight and the total amount subscribed is $1178.99 greater than last year.

I personally visited quite a large number of Agricultural Societies and invariably one observes a greater interest in Live Stock Improvement than at any previous period. This is especially true in Dairy Cattle. This is to some extent due to the establishment of new creameries and improved methods of operating the same but largely to a general awakening to the importance of Live Stock in Agriculture and a proper recognition of the value of quality. Breeders will do well to recognize the ever increasing demand for high class individuals backed up by official records.

In a general effort to improve Live Stock the "Scrub Sire" menace appears in an aggravated form.

In order to try to control this nuisance to some extent a petition largely signed by members of the majority of Agricultural Societies was presented to the Legislature in session. A satisfactory Act was drafted and passed the Legislative body but was defeated in the Council. A further effort to have this Act become law, which we hope will be successful, will be made at the next session of the Legislature.

The fact that societies are willing to pay better prices for first class animals has the extra merit of inducing officers of Societies to see that the animals receive better care than formerly, hence increased demands for appropriations for paddocks for giving animals proper exercise.

Another pleasing feature is that Societies are paying more attention to the selection of breeds suited to their requirements. The haphazard method of changing back and forth from one breed to another has almost ceased to exist.

In conclusion I would say that the outlook for Live Stock improvement has never been as promising as at the present time.

Respectfully submitted,

F. L. FULLER.

Previous Record of Agricultural Societies in Nova Scotia.

The fluctuation in the numbers and strength of Agricultural Societies in the Province during the last fifty three years is shown in the following table, from which it will be seen that the number of Societies has been increased from the original number of thirty-seven to two hundred and sixty-three, membership from 1,744 to 10,523; subscriptions from $1,859.90 to $20,967.80; and grants in aid from $3,010 to $15,000.00.

Comparative Statement showing the number and strength of Agricultural Societies organized under the Act for Encouragement of Agriculture in each year, for fifty-three years from 1864 *to* 1916 *both inclusive.*

YEAR	No. of Soc.	No. of Memb's	Amount of Subscription	Grants in Aid
1st Year 1864	37	1744	$1859 90	$3010 00
11th " 1874	64	3971	4495 00	5830 50
21st " 1884	92	5064	6361 59	6835 00
22nd " 1885	88	4592	5225 00	6556 50
23rd " 1886	91	4532	5334 90	6653 00
24th " 1887	85	4432	1571 85	6597 00
25th " 1888	83	3986	4659 47	6361 00
26th " 1889	82	4398	5170 10	6444 00
27th " 1890	81	4152	5257 45	6420 00
28th " 1891	81	4136	5172 29	6432 20
29th " 1892	80	4273	5856 53	6525 00
30th " 1893	81	4068	5051 55	6309 50
31st " 1894	80	4398	4424 55	8000 00
32nd " 1895	83	4597	5356 15	8000 00
33rd " 1896	85	4888	5657 30	8000 00
34th " 1897	89	5238	5997 16	8000 00
35th " 1898	103	6155	7092 90	8000 00
36th " 1899	119	6974	8502 45	10000 00
37th " 1900	131	7362	9322 60	10000 00
38th " 1901	151	8500	10771 53	10000 00
39th " 1902	163	8973	11688 43	10000 00
40th " 1903	172	9444	13209 65	10000 00
41st " 1904	166	8426	11634 80	10000 00
42nd " 1905	164	8398	11888 90	10000 00
43rd " 1906	166	8498	12900 51	10000 00
44th " 1907	160	7849	15015 40	10000 00
45th " 1908	167	7596	11284 77	10000 00
46th " 1909	179	8090	12158 95	10000 00
47th " 1910	187	8315	12732 45	10000 00
48th " 1911	200	8567	13137 45	10000 00
49th " 1912	205	8503	13256 73	10000 00
50th " 1913	219	9248	16799 03	15000 00
51st " 1914	226	9769	17869 11	15000 00
52nd " 1915	247	10315	19788 81	15000 00
53rd " 1916	263	10523	20764 94	15000 00

STATEMENT OF SOCIETIES FOR 1916.

There are two hundred and sixty-three Agricultural Societies in the province which have qualified for participation in the grant for 1917. Six of the societies reported last year failed to qualify and twenty new societies have been added and two resuscitated.

The following list shows the total number of members of the Societies of each county, the total amount of subscriptions duly declared to, according to the provisions of the Act, as paid by the members within the year, and the total amount of grant qualified for by the several counties.

COUNTRIES	No. of Societies 1915.	Number of Members	Total Amount Subscription	Total Amount Grant in Aid
Annapolis..........	25	918	$2141 25	$1387 73
Antigonish.........	29	776	1954 10	1429 79
Cape Breton........	11	329	867 25	585 16
Colchester..........	21	790	1651 20	1115 60
Cumberland........	16	604	1300 75	864 49
Digby..............	7	531	754 50	441 21
Guysboro...........	12	486	712 10	585 27
Halifax.............	7	263	588 00	384 64
Hants..............	12	500	1507 25	829 00
Inverness...........	20	759	1363 10	991 31
Kings..............	13	601	1372 57	809 66
Lunenburg.........	23	1385	1966 75	1275 63
Pictou.............	32	928	1952 00	1508 31
Queens.............	4	118	205 00	175 28
Richmond..........	15	543	832 87	679 12
Shelburne..........	3	202	222 00	153 65
Victoria............	7	178	363 50	308 37
Yarmouth.........	5	612	1011 75	475 78
Total.............	263	10523	$20746 94	$14000 00

LIST *of Agricultural Societies organized under the Acts for Encouragement of Agriculture with* (1) *names of principal officers*; (2) *number of members*; (3) *amount of subscriptions officially declared to in the terms of the Acts as paid*

ANNAPOLIS COUNTY.

Annapolis Royal.—President, Rev. R. H. Howe, Annapolis Royal; Vice-President, Robt. Hardwick, Annapolis; Secy-Treasurer, Geo. L. Cain, Annapolis Royal; Directors: J. G. Cameron, A. J. Willis, J. J. Balcom, F. A. Chipman, W. A. Marshall, Annapolis Royal; Auditors: A. H. Harris, Fred Groucher..............................

Brooklyn.—President, C. A. Neily, R. R. I, Middleton; Vice-President, J. O. Stevenson, R. R. 1, Middleton; Secy-Treasurer, C. E. Wright, R. R. 1, Middleton; Directors: Melbourne Whitman, R. R. 1, Middleton; J. O. Stevson; P. F. Young, L. P. Bruce, R. R. 1, Clifton; Robie Bruce, R. R. 1, Clifton; Auditors: L. P. Bruce, Robie Bruce....................................

Bridgetown.—President, S. Pratt, Bridgetown; Vice-President, E. M. Foster, Bridgetown; Secy-Treasurer, H. I. Patterson, Bridgetown; Directors: H. W. King, J. S. Moses, M. P. Chute, K. Lawrence, S. Pratt, Bridgetown....

Clarence.—President, A. P. Ramsey, Clarence; Vice-President, Stewart Leonard, Clarence; Secy-Treasurer, A. J. Wilson, Clarence; Directors: Avard Jackson, Stewart Leonard, C. H. Jackson, A. C. Chute, Eldon Marshall, Albert Banks, J. W. Elliott, Clarence.................

Clarence West.—President, S. L. Marshall, Clarence; Vice-President, John Myers, Clarence; Secy-Treasurer, W. R. Miller, Clarence; Directors: E. H. Woodworth, W. M. Stronach, E. B. Miller, A. G. Marshall, Judson Chute, Clarence; Auditors: E. B. Millar. W. M. Stronach.......

Clementsvale.—President, Albert S. Brown, Clementsvale; Vice-President, James H. Robinson, Clementsvale; Secy-Treasurer, Leslie Baird, Clementsvale; Directors: Edward M. Potter, Reginald Baird, Ralph Potter, Asa Potter, Geo. Ramsey, Clementsvale; Auditors: James Robinson, Chas. Trimper...........................

for 1916; *and* (4) *total receipts, total expenditure,* (*c*) *balance in hand,* (*d*) *deficit*; (5) *amount of grant apportioned to each society for* 1917, *subject to compliance in other respects with the requirements of the Act.*

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
27	40 00	40 00	127 11	100 80	26 31
32	50 00	43 40	111 41	106 25	5 16
35	57 00	45 77	New	Society	
59	155 25	79 16	315 68	357 03	41 35
16	73 00	51 22	New	Society	
30	59 50	46 62	180 15	82 65	97 50

Cleveland.—President, Major D. G. Ritcey, Nictaux Falls; Vice-President, C. W. Hoffman, Nictaux Falls; Secy-Treasurer, Archibald Feindel, Nictaux Falls; Directors: H. B. Willett, C. W. Hoffman, M. W. Burns, C. C. Smith, G. C. Whitman, Nictaux Falls; Auditors: C. W. Hoffman, G. C. Whitman ....

Falkland Ridge.—President, Geo. Roop, Falkland Ridge Vice-President, Herman Sproul, Falkland Ridge; Secretary, C. R. Marshall, Falkland Ridge; Treasurer, Percy Starratt, Falkland Ridge; Directors: E. E. Wagner, Anthony Wagner, A. C. Roop, W. L. Sproul, James Sproul, Falkland Ridge; Auditors: E. E. Wagner, Robt. Swallow ....

Forest Glade.—President, P. D. Bent, Forest Glade; Vice-President, Fowler Forsyth, Margaretville; Secy-Treasurer, D. A. Downing, Margaretville; Directors: A. D. Gates, J. D. Gates, Forest Glade; Reis Stronach, Stronach Mountain; Alva Thorne, Prince Albert; John Hodgins, Margaretville; Auditors; A. D. Gates, J. D. Gates ....

Granville Centre.—President, Norman Wade, Granville Centre; Vice-President, Archie F. Troop, Granville Centre; Secy-Treasurer, Frank R. Troop, Granville Centre; Directors: Archie F. Troop, Frank P. Mills, Willard Withers, Robt. Troop, Clarence Eaton, Granville Centre ....

Laurie.—President, J. S. Marshall, Spa Springs; Vice-President, L. R. Archibald; Secy-Treasurer, A. F. Gordon, Spa Springs; Directors: J. A. Woodbury, F. A. Balser, C. W. Daniels, Thos. Slack, A. F. Gordon, Spa. Springs ....

Lawrencetown.—President, Arthur Sutherland, Lawrencetown; Vice-President, F. O. Foster, Lawrencetown; Secy-Treasurer, H. T. Phinney, Lawrencetown; Directors: L. H. Stoddard, F. O. Foster, F. G. Foster, F. G. Palfrey, W. H. Phinney, Lawrencetown; Auditors: J. E. Shaffner, H. H. Whitman ....

Mount Hanley.—President, E. J. Elliott, Mount Hanley; Vice-President, J. J. Fritz, Mount Hanley; Secy-Treasurer, A. W. Slocom, Mt. Hanley; Directors: R. B. Miller, Albert Woodworth, Burpee Armstrong, Caleb Slocom, Mt. Hanley; Auditors: Ben Barteaux, C. Barteaux ....

Number of Members	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
25	62 00	47 47	118 05	128 67	10 62
27	70.50	50.38	289 05	128 67	45 25
76	218 00	100 48	357 67	241 92	115 75
34	83 00	54 60	432 69	367 55	65 14
42	52 00	44 07	264 35	234 35	30 00
40	40 00	40 00	New	Society	
42	48 50	42 88	128 09	84 25	43 84

Nictaux.—President, G. D. Morse, Nictaux West; Vice-President, F. B. Morse, Nictaux West; Secy-Treasurer, N. M. Beckwith, Reidvale; Directors: F. B. Morse, A. L. Neily, Willard Ruggles, Irvin Morse, Nictaux West; Elias Elias Barteaux, Reidvale; Auditors: Elias Barteaux, C. S. Rogers ....

Paradise.—President, J. S. Longley, Paradise; Vice-President, F. W. Bishop, Paradise; Secy-Treasurer, R. S. Leonard, Paradise; Directors, L. H. Balcom, J. S. Ritcey, J. C. Phinney, Paradise; H. C. Bent, Bridgetown; A. W. Phinney, Bridgetown; Auditors: H. A. Longley, C. S. Bathanly ....

Riverview.—President, W. E. Illsley, R. R. 1, Lawrencetown; Vice-President, D. M. Charlton, R. R. 1, Lawrencetowd; Secy-Treasurer, R. L. Moore, R. R. 1, Lawrencetown; Directors: R. J. Messenger, T. R. Charlton, W. W. Whitman, H. Baland, A. C. Stevenson, R R 1, Lawrencetown; Auditors: R. J. Messenger T. R. Charlton ....

Springfield.—President, Jacob Roop, Springfield; Vice-President, Albert Gremon, Springfield; Secy-Treasurer, Irving C. Mason, Springfield; Directors: G. A. Durling, Donald Morrison, Albert Gremon, Johnson Crouse, Elwyn Starratt, Springfield; Auditors: E. C. Durling, Donald Morrison ....

Stoney Beach.—President, S. E. Thorne, Lower Granville; Vice-President, H. Winchester, Lower Granville; Secy-Treasurer, W. B. Winchester, Granville Ferry; Directors: E. A. Fitch, Lower Granville; E. D. Farnsworth, Samuel Blaney, Ansel Orde, Holland Snow, Lower Granville; Auditors: J. T. Thorne, G. P. Littlewood ....

Torbrook.—President, H. B. Wheelock, Torbrook West; Vice-President, Emerson Wheelock, Torbrook West; Vice-Vice-President, Emerson Wheelock, Torbrook West; Secy Treasurer, A. Stanley Brown, Torbrook West; Directors: J. W. Jefferson, A. J. Whitman, Martin Ulham, Judson ArWstrong, Arthur Jefferson, Torbrook West; Auditors; Arthur Jefferson, Judson Armstrong ....

Tupperville.—President, Howard Bent, Tupperville; Vice-President, J. S. Bent, Tupperville; Secy-Treasurer, C. R. Bent, Tupperville; Directors: C. Tupper J. S. Bent, H. Crosby, Fred Bent, L. W. Chipman, Tupperville; Auditors: H. E. Bent, P. C. Inglis ....

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
39	105 75	62 32	448 68	289 00	159 68
43	121 75	67 78	370 75	243 59	27 16
46	102 75	61 33	272 21	216 50	55 71
49	103 00	61 41	227 74	176 20	51 55
27	60 50	46 96	189 10	85 25	112 85
23	46 50	42 21	127 84	80 50	47 34
21	104 00	61 74			

Union.—President, R. Van Ditmars, Deep Brook; Vice-President, J. F. McWillard, Deep Brook; Secy-Treasurer, Robt. Spurr, Deep Brook; Directors: Walter Purdy, E. R. Pinkney, Frank Ruggles, J. M. Nichols, Deep Brook; Auditors: Walter Purdy, J. M. Nichols . . . .

Upper Granville.—President, Frank Bath, Granville; Vice-President, Wm. A. Horton, Granville; Secy-Treasurer, Adam C. Clarke, Granville; Directors: John Bath, M. Wentzell, R. F. Parker, J. B. Gillis, J. Cuthbertson, Granville . . . .

Wilmot Mountain.—President, Isreal Banks, St. Croix Cove; Vice-President, Wm. Grant, Port Lorne; Secy-Treasurer, Fred R. Stark, St. Croix Cove; Directors: Joseph Stark, Arlington, Edward Ristein, Webb Millberry, Chas. Beardsley, Port Lorne; Auditors: Delbert Johnson, Joshua Brinton . . . .

Wilmot.—President, N. P. Wood, Wilmot; Vice-President, A. P. Bowlby, Wilmot; Secy-Treasurer, S. A. Patterson, Wilmot; Directors: Milledge Best, Louis Wotton, G. Margeson, H. R. Pierce, Wilmot; Auditors: N. R. Bowlby, H. R. Pierce . . . .

Williamston.—President, Harry Barteaux, Lawrencetown; Vice-President, A. F. Morse, South Williamston; Secy-Treasurer, B. M. Shankel, South Williamston; Directors: E. C. Shaffner, A. H. Bishop, F. A. Randolph, J. F. Schaffner, W. A. Hunt, South Williamston; Auditor, F. A. Randolph . . . .

ANTIGONISH COUNTY.

Antigonish.—President, Thos. McAmis, Antigonish; Vice-President, Jas. Thompson, Cloverville; Secy-Treasurer, J. C. McNaughton, Box 135, Antigonish; Directors: D. D. Chisholm, F. R. Trotter, J. G. Taylor, Angus Kell, Antigonish; Jas. Dunn, Lower South River; Auditors: F. M. McPhie, D. D. Chisholm . . . .

Antigonish Harbor.—President, Hugh McNeil, Harbor Centre; Vice-President, William Chisholm, Harbor Centre; Secy-Treasurer, Thos. Hogan, Harbor Road; Directors: Thos. Graham, J. W. Chisholm, Antigonish Harbor; John P. Grant, Harbor Centre; Auditors: John W. Chisholm Arch McDonald. . . . .

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance
49	95 00	58 68	259 74	242 10	17 64
23	110 00	63 79	401 42	370 35	31 07
46	84 00	54 95	347 55	249 74	97 81
29	49 75	43 31	234 52	176 35	58 17
38	149 50	77 20	293 31	264 55	28 76
63	82 00	54 29	259 08	153 00	106 08
23	42 75	41 10	92 78	80 72	12 06

Arisaig.—President, A. J. McDonald, Arisaig; Vice-President, Angus A. McDonald, Arisaig; Secy-Treasurer, L. A. Gillis, Arisaig; Directors: A. R. Gillis, Arisaig; Dan H. McDonald, Wm. McPherson, Dan McDonald, J. J. Ross, Arisaig......................................

Beaver Meadow.—President, John A. McDonald, James River Station, Vice-President, Alex. McLean, James River Station; Secy-Treasurer, A. J. McDonald, James River Station; Directors: Wm. A. McDonald, James River Station; Wm. McRae, Hugh McDonald, Harry P. Baxter, Addington Forks; David D. Fraser, St. Joseph's; Auditors: Hugh A. McDonald, Rod A. McDonald................

Black Avon.—President, Donald McDonald, Heatherton; Vice-President, J. D. McDonald, Heatherton; Secy-Treasurer, Alex. A. McDonald, Heatherton; Directors: L. R. McDonald, Alex. McDonald, Donald McPherson, J. A. Mills, Stephen McNeil, Heatherton; Auditors: Wm. McMillan, Dan Kennedy.......................

Clydesdale.—President, Ronald McDonald, Clydesdale; Vice-President, John A. Chisholm, Slyvan Valley; Secy-Treasurer, Harry Eadie, Clydesdale; Directors: Chas. Pushie, Wm. J. Chisholm, Alex. McDonald, John Chisholm, Adam Kirk, Clydesdale; Auditors: Wm. J. Chisholm, Ronald McDonald...............................

Copper Lake and Middleton.—President, A. W. Hattie, Copper Lake; Vice-President, A. F. Grant, Copper Lake; Secy-Treasurer, Arthur Sutherland, Copper Lake; Directors: D. R. Henderson, A. F. Grant, J. Stewart, John Bray, Copper Lake; Auditors: John Bray and M. Sutherland....

Fairmont.—President, Wm. J. Walsh, Fairmont; Vice-President, John McNeil, Fairmont; Secy-Treasurer, J. D. Hanrahan; Fairmont; Directors: Thos. Brophy, Brophy's P. O.; John A. McPherson, Alin Cameron, Alex. McPherson, P. J. Hanrahan, Fairmont; Auditors: Dan Cameron, P. J. Hanrahan...............................

Fraser's Grant.—President, Ronald McDonald, Fraser's Grant; Vice-President, Rod. J. McDonald, Fraser's Grant; Secy-Treasurer, Alex. Fraser, Fraser's Grant; Directors: Dan J. McDonald, Alex. S. McDonald, Alex. McPhail, Murdock Cross, Chas. Perro, Fraser's Grant; Auditor's: Wm. Tate, A. H. Rogers...........................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
15	40 00	40 00	115 73	114 83	90
41	69 50	50 27	228 41	189 60	38 81
18	45 00	41 70	158 12	194 13	36 01
16	48 50	42 88	109 30	62 75	46 55
27	80 00	53 41	New	Society	
27	43 50	41 19	151 60	93 65	57 95
26	58 00	46 11	122 54	100 33	22 21

Georgeville.—President, D. A. McInnis, Georgeville; Vice-President, Dan Fraser, Georgeville; Secy-Treasurer J. D. McGillvray, Georgeville; Directors: F. D. Gillis, Rod McDougall, J. D. McDougall, Angus McLean, John Gillis, Georgeville; Auditors: Angus McPherson, Dan Fraser..

Glassburn.—President, John W. Chisholm, Glassburn; Vice-President, Alex. J. Chisholm, Glassburn; Secy-Treasurer, Duncan Chisholm, Glassburn; Directors: Jas. Grant, John J. Chisholm, Daniel Chisholm, Rod D. Chisholm, Glassburn; Auditors: Finlay McDonald, James Grant....

Harbor Au Boucher.—President, David Benoit, East Harbor Au Boucher; Vice-President, Allan Anderson, East Harbor Au Boucher; Secy-Treasurer, Lucien de Coste, Cape Jack; Directors: Chas. Boucher, J. T. Crispo, Moses Bran, Cape Jack; Edmund Levanger, Frankville; Auditors: T. T. Crispo, Chas. Boucher........................

Lakevale.—President, Duncan C. McNeil, Lakevale; Vice-President, J. J. McGillvray, Lakevale; Secy-Treasurer, Rev. D. Beaton, Lakevale; Directors: Dougall McDonald, Morristown; John A. Boyd, West Lakevale; Angus A. McGillvray, West Lakevale; Don Wallace, Angus H. McDonald, West Lakevale; Auditors: John A. McDougall, Dan McGillvray.................................

Lochaber.—President, Daniel McDonald, South Lochaber; Vice-President, John D. Cameron, South Lochaber; Secy-Treasurer, John O'Leary, South Lochaber; Directors: Wm. McDonald, Wm. Taylor, South Lochaber; J. R. Morrison, Collegevale; Chas. Stewart, College Grant; Hugh McInnis, West Lochaber; Auditors: John Polson, Jas. Moore..

Malignant Cove.—President, D. R. McDonald, Malignant Cove; Vice-President, A. R. McAdam, Malignant Cove Secy-Treasurer, M. D. McDonald, Malignant Cove; Directors: John Chisholm, D. M. McDonald, A. McGillvray, A. R. McAdam, Hector McNeil, Malignant Cove; Auditors: John D. Chisholm, D. McDonald......................

Maryvale.—President, R. H. McGillvray, Lennox; Vice-President, A. A. McDougall, Maryvale; Secy-Treasurer, R. A. McDonald, Lennox; Directors: R. A. McGillvray, Lennox; J. A. McDonald, Maryvale; Allan McDonald, Angus H. McDonald, A. A. McDonald, Maryvale; Auditors: W. McKinnon, A. D. McDonald..................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
17	46 00	42 03	141 37	140 50	87
27	188 85	90 58	625 46	467 60	157 86
46	97 00	59 40	257 93	99 00	148 93
20	60 00	46 77	169 13	152 92	16 21
34	72 50	51 07	143 97	150 46	6 49
16	40 00	40 00	113 59	85 85	27 74
17	42 00	40 68	95 04	99 17	4 13

Morar.—President, Angus Brown, Livingston Cove; Vice-President, John J. McPherson, Livingstone Cove; Secy-Treasurer, Alex. J. Gillis, Morar; Directors: Allan Adams, John McMullin, Jas. McDougall, Wm. McEchern, Livingston Cove; Daniel Nickerson, Morar......

McAra's Brook.—President, Wm. B. McGillvray, McAra's Brook; Vice-President, John D. McPherson, McAra's Brook; Secy-Treasurer, John W. McAdam, McAra's Brook; Directors: John A. McPherson, John D. Smith, John R. McAdam, McAra's Brook; Auditors: John H. McEchern, John D. McLeod..............................

North Grant.—President, George Sutton, Antigonish; Vice-President, Frank Chisholm, Antigonish; Secy-Treasurer, W. A. Chisholm, Box 404, Antigonish; Directors: R. Chisholm, Bailey Brook; John C. Chisholm, Bailey Brook Laughlin, McLellan, John Grant, North Grant; Chisholm Grant, Clydesdale; Auditors: Joe Grant, Geo. Sutton.....

Ohio.—President, Alex. Chisholm, Ohio; Vice-President, John I McGillvray, Ohio; Secy-Treasurer, Hamish Sutherland, Ohio; Directors: John McDonald, Peter McLean, Dan McIsaac, D. A. McMillan, Ronald McDonald, Ohio; Auditors, Angus McInnis, Ronald McDonald......

Pleasant Valley.—President, Dan McIsaac, Pleasant Valley; Vice-President, Dan Cameron, Pleasant Valley; Secy-Treasurer, R. M. McDonald, Pleasant Valley; Directors: Angus D McGillvray, Dougald J. McGillvray, Colin McGillvray, Angus D. McEchern, Pleasant Valley; Auditors: A. D. McGillvray, Ronald McIsaac................

Pomquet.—President, Edmund Deon, Pomquet; Vice-President, Xavier Doiron, Monk's Head; Secy-Treasurer, E. A. Doiron, Pomquet; Directors: C. H. Landry, Pomquet; C. H. Landry, Pomquet; Joe Landry, Andrew Benoit, Wm. Landry, Thos. Landry, Pomquet Station; Auditors: Joe Benoit, Henry G. Landry........................

St. Andrews.—President, James R. Chisholm, Maryvale; Vice-President, John C. Chisholm, St. Andrews; Secy-Treasurer, Rev. A. J. Chisholm, St. Andrews; Directors: Angus A. McDonnell, Glenroy; Robt. Chisholm, Allan McDonald, Hugh J. McDonald, Hugh A. McGillvray, St. Andrews; Auditors: Dan A. Boyd, John C. Chisholm......................................

Number of Members-	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
22	43 45	41 15	90 07	90 07	
16	43 30	41 12	116 00	94 80	21 20
35	63 00	47 82	153 28	78 60	74 68
16	48 00	42 72	New	Society	
20	42 00	40 68	179 38	171 51	7 87
44	213 61	80 68	312 52	268 40	44 12
22	45 25	41 79	168 97	155 05	13 92

South River.—President, Malcolm Sinclair, Fraser's Mills; Vice-President, D. J. McDonald, Fraser's Mills; Secy-Treasurer, D. D. McGillvray, McPherson's P. O.; Directors: John D. Cameron, D. W. Chisholm, McPherson's P. O.; Duncan McDonald, A. J. McDonnell, D. R. McDonnell, Fraser's Mills; Auditors, Jas. D. Boyd, Andrew McDonald..

South River and Loch Katrine.—President, John A. McMillan, Upper South River; Vice-President, J. F. McNaughton, Loch Katrine; Secy-Treasurer, John A. Cameron, Loch Katrine; Directors: John H. McDonald, Angus A. McDonald, A. H. McPherson, Upper South River; J. H. Kennedy, A. D. McIntosh, Loch Katrine; Auditors: A. D. McPherson, H. McGregor........................

South Side Cape George.—President, J. F. McEchern, Ballentyne Cove; Vice-President, Duncan Gillis, Cape George; Secy-Treasurer, John M. McEachern, Cape George; Directors: Wm. McPhie, C. J. McEchern, Wm. McInnis, Cape George; Alex. McInnis, Ballentyne's Cove; Colin McDonald, Ballentyne Cove...........................

South Side Harbor.—President, R. Fraser, S. S. Harbor; Vice-President, Ronald Cameron, Lower South River; Secy-Treasurer, Allan McDonald, South River Station; Directors: D. McDonald, Colin Chisholm, J. C. Crosby, W. R. Chisholm, R. McDonald, South Side Harbor; Auditors: Alex. Cameron, Rod. Chisholm....................

Tracadie.—President, Joseph Landry, Tracadie; Vice-President, Ambrose Connors, Bayfield; Secy-Treasurer, W. H. Delorey, Tracadie; Directors: Jas. McMullin, Bayfield; Jas. Riley, Tracadie, Angus Pettipas, Tracadie; Wm. Wallace, Big Tracadie; John Torpey, Afton; Auditors: Peter Landry, Richard McMillan.....................

West River.—Dan J. McDonald, Purl Brook; Vice-President, Alex. Kennedy, Purl Brook; Secy-Treasurer, Ronald C. McGillvray, Geln Road; Directors: Thos. Eldridge, Alex. Kirk, Alex. Kennedy, Angus D. McDonald, Purl Brook; Frank McNaughton, Salt Springs; Auditors: Alex. Kirk, Thos. Ethridge...............................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
24	62 50	47 53	209 62	189 62	20 00
25	69 00	50 23	165 39	168 50	3 11
23	41 00	40 33	84 89	82 20	2 69
21	46 00	42 03	119 20	117 50	1 70
41	138 00	72 74	355 44	159 59	139 85
34	97 25	59 47	146 91	587 17	440 26

CAPE BRETON COUNTY.

Edwardsville.—President, Thos. Rudderham, Edwardsville; Vice-President, S. R. Lewis, Edwardsville; Secy-Treasurer, Jas. Keating, Edwardsville; Directors: Ernest Fraser, Edwardsville; Wallace Lewis, Point Edward; J. B. Lewis, Edwardsville; Stanley Lewis, Tom Roberts, Edwardsville; Auditors: Harry Lewis, Leonard Lewis........

East Bay.—President, J. H. McDonald, East Bay; Vice-President, Peter Gillis, East Bay; Secy-Treasurer, Rev. J. W. McIsaac, P. P., East Bay; irectors: Angus McGillvray, North Side East Bay; Dan R. McIsaac, East Bay; Neil McNeil, East Bay; Angus J. McEachern, Glen Morrison, Angus McIsaac, East Bay....................

Grand Mira.—President, Michael D. Currie, Grand Mira South; Vice-President, Joseph McKinnon, Grand Mira South; Secy-Treasurer, Leo Campbell, French Road; Directors: J. J. Gillis, Neil J. Gillis, Archie L. Gillis, Alex. J. Gillis, Grand Mira South; Auditors: John A. Gillis, Neil G. Gillis...

George's River.—President, E. J. Johnstone, George's River; Vice-President, Peter Almon, George's River; Secy-Treasurer, A. B. McPhee, Leitche's Creek Station; Directors: Thos. Dobson, Harry Carmichael, John P. Harvey, Wilson Gillis, George's River; Geo. H. Young, George's River Station; Auditors: Luke Day, John McMullin..........

Groves Point.—President, H. A. Moffatt, Groves Point; Vice-President, L. L. Oliver, Groves Point; Secy-Treasurer, Jas. Stuart, Groves Point; Directors: Rod Campbell, Hillside; Dan McKenzie, Hillside; Jas. McLeod, Groves Point; Alex. McKay, J. R. Bain, Groves Point; Auditors: Rod Campbell, Jas. McLeod..........................

Homeville and Mira Bay.—President, Ronald McKeigon Catalone; Vice-President, Harry Dillon, Round Island; Secy-Treasurer, Chas. Spencer, Mira Gut; Directors: Everett Spencer, Herbert Spencer, D. J. Martel, Wesley Micoll, Mira Gut; Chas. Dillon, Round Island; Auditors: Harvey Dillon, Donald McInnis..........................

Little Bras D'Or.—President, Parker M. Rice, George's River; Vice-President, Robt. Moffatt, Little Bras D'Or; Secy-Treasurer, W. W. Johnston, North Sydney; Directors: Thos. Lawley, North Sydney; W. J. Moffatt, Little Bras D'Or; Chas. Johnston, Levi Hull, North Sydney; Geo. Howatson, Little Bras D'Or; Auditors: Lloyd McKay Johnston, Chas. Johnston..........................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
26	68 50	49 69	151 78	111 75	40 03
20	40 00	40 00	236 29	146 09	90 20
18	43 00	41 02	83 70	25 25	58 45
37	55 75	45 36	291 97	269 85	22 12
22	44 00	41 36	100 30	80 75	19 55
15	45 00	41 70	171 10	140 55	30 55
35	48 00	42 73	215 49	107 45	108 04

North Sydney.—President, J. Webster Allen, North Sydney; Vice-President, John Musgrave, North Sydney; Secretary, Neal Benton, North Sydney; Treasurer, John McQueen, North Sydney; Directors: Kenneth Gordon, C. A. Munn, C. Lemoine, Harry Moore, Stanley Green, North Sydney; Auditors: L. H. Moffatt, A. K. Jackson....

Salem Road.—President, N. J. McDonald, Enon; Vice-President, John A. McDonald, Lake Uist; Secy-Treasurer, A. J. McCuish, Lake Uist; Directors: John W. McDonald, Salem Road; D. A. McDonald, Terra Nova; Angus McCuish Big Glen; Alex. McDonald, Enon; D. A. McKinnon, Big Glen; Auditors: R. W. Munro, Angus McDonald..........

South Bar—President, A. R. Richardson, South Bar; Vice-President, A. J. McLeod, South Bar; Secy-Treasurer, F. A. McInnis, Whitney Pier, Sydney; Directors: Howard Richardson, Abner McLennan, Rodk. McLennan, F. A. Richardson, Percy Richardson, South Bar; Auditors: Y. H. Barrington, Edward Murphy...........................

Sydney Forks.—President, Rod McRae, Sydney Forks; Vice-President, Neil McNeil, Sydney Forks; Secy-Treasurer Gus B. McDonald, Sydney Forks; Directors: Michael P. Gillis, Meadows; Dan McAdam, Meadows; Melanson Smith, Sydney Forks, Robt. McDonald, Sydney Forks; Angus L. McDonald, Sydney Forks; Auditors: Neil McNeil, Robt. McDonald...................................

COLCHESTER COUNTY.

Agricola.—President, Adam Bently, Otter Brook; Vice-Pres. H. M. Smith, Otter Brook; Secretary, H. C. Dunlap, Otter Brook; Treasurer, J. S. Dunlap, Mid. Stewiacke; Directors: Hedley Creelman, Otter Brook; Clifford Sell, Mid. Stewiacke; J. D. Dunlap, Mid. Stewiacke; C. C. Cox, Upper Stewiacke; C. B. Bentley, Mid. Stewiacke; Auditors: Hedley Creelman, J. D. Dunlap........................

Annan.—President, Angus Murray, Tatamagouche Mountain; Vice-President, Wm. Baillie, South Tatamagouche; Secy-Treasurer, H. B. Cock, South Tatamagouche; Directors: Malcolm Thompson, Central New Annan; Arthur Tucker, Tatamagouche Mountain; John Baillie, Kavanagh Mills; Jerdon Thompson, Tatamagouche Mountain, Albert Cock, East New Annan; Auditors: Malcolm Thompson, Jerdon Thompson........................

Number of Members	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
42	137 00	72 95	245 78	227 78	18 00
73	285 00	123 21	531 47	531 47	
19	57 00	45 78	129 30	144 00	14 70
22	44 00	41 36	120 50	43 00	77 50
46	117 50	63 34	200 37	294 97	94 60
26	43 20	41 09	175 08	202 19	27 11

Balmoral Mills.—President, R. D. McKay, Balmoral Mills; Vice-President, Alex. S. McKay, Balmoral Mills; Secy-Treasurer, John Munro, Balmoral Mills; Directors: Geo. S. Baillie, Hugh W. McKay, Peter A. McDonald, John A. Fergusin, R. D. McKay, Balmoral Mills; Auditors: Geo. Baillie, Hugh McKay..........................

Bass River.—President, J. H. Fulton, Bass River; Vice-President, S. H. Fulton, Little Bass River; Secy-Treasurer, Jas. H. Fulton, Bass River; Directors: D. H. Lank Upper Bass River; S. H. Fulton, Little Bass River; Wm. Starratt, Upper Bass River; Capt. E. Thompson, Bass River; Burton Densmore, Upper Economy; Auditors: Amos Fulton, Capt. E. Thompson....................................

Bay Head.—President, Sidney Clark, Bayhead R. R. I; Vice-President, Walter Ross, Bayhead, R. R. I; Secretary, J. L. Cunningham, Bayhead R. R. I.; Treasurer, A. S. McDonald, Bayhead, R. R. I; Directors: Arthur Upham, A. R. Langille, Harry Holmes, David Roberts, Sam Matattall, Bayhead R. R. I; Auditors: Wm. Millard, Geo. Dunphey...

Brookfield.—President, J. T. Bell, Brookfield; Vice-President, Walter Ross, Brookfield; Secy-Treasurer, Elwood, McLellan, Brookfield; Directors: Melville Carter, T. D. Bates, Percy Bentley, Fred Lockhart, Albert Bower, Brookfield; Auditors: E. D. Benjamin, J. J. Hamilton..

Brule Shore.—President, R. D. Malcolm, R. R. 1; Tatamagouche; Vice-President, Noah Jollimore, Tatamagouche, R. R. 1; Secy.-Treas., Jas. S. Read, R. R. 1, Tatamagouche; Directors: Noah Jollimore, Alex. McKinnon, Geo. Dunn, A. P. Semple, Geo. Fraser, Tatamagouche, R. R. 1; Auditors: Geo. Dunn, Noah Jollimore..........

Dairy.—President, John A. Wilson, Central New Annan; Vice-President, Geo. R. Miller, Central New Annan; Secy-Treasurer, C. J. Cock, Central New Annan; Directors: Geo. R. Miller, John C. Bell, West New Annan; Ira Nelson, Tatamagouche; Alex, M. Swan, Central New Annan; H. H. McNutt, Tatamagouche Mountain...................

Earltown.—President, Geo. McIntosh, Earltown; Vice-President, John A. Murray, Earltown; Secy-Treasurer, R. E. McKay, Earltown; Directors: W. D, McKay, John A. Murray, J. R. Gunn, Thos. McKay, Earltown; Auditors: John A. Murray, Geo. McIntosh.....................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
27	40 50	40 20	226 93	186 31	40 62
30	74 50	51 74	164 78	161 00	3 78
25	55 00	45 00	117 36	76 50	40 86
39	100 25	60 49	257 64	174 40	83 24
32	63 00	47 81	144 78	89 30	55 48
27	40 50	40 20	212 55	199 65	12 90
22	44 00	41 36	88 52	89 62	1 10

Farmers.—President, Murray Currie, Londonderry Station; Vice-President, Robie McKay, Londonderry Station; Secy-Treasurer, Harvey Gray, East Mines Station; Directors: W. P. Weatherbee, E. A. McLean, Geo. Dill, W. E. McLean, E. C. Fletcher, Glenholme; Auditors: R. McKay, W. E. McLean..................................

Londonderry.—President, W. W. Blanchard, Glenholme Vice-President, Ernest McCully, Masstown; Secretary, T. W. Morrison, Glenholme; Treasurer, Harvey Gray, Glenholme; Directors: Capt. A. McNutt, Chas. Vance, Stephen Jennings, Masstown; M. N. Reid, Glenholme; Gordon Wyllie, DeBert; Auditors: Arthur Putnam, Fowler Fletcher..

Middleton.—President, David McLeod, Denmark; Vice-President, Robt. Wilson, Denmark; Secy-Treasurer, Oliver Stevenson, Denmark; Directors: Robt. Wilson, John Langille, Jas. Hogan, Seldon Swan, Livingston Cameron, Denmark; Auditors: Seldon Swan, Wm. Mingo...........

Millburn.—President, John Bonyman, Millburn; Vice-President, Walter Langille; Secy-Treasurer, Henry W. Swan, Millburn; Directors: Thos. Chalmer, Arthur Byers, Aubrey Byers, John Hutcheson, A. W. Swan, Millburn....

North Earltown.—President, Wellington Ross, North Earltown; Vice-President, Wm. M. Stewart, North Earttown; Secy-Treasurer, Alex. W. McKay, North Earltown; Directors: Daniel G. Ross, North Earltown; David Munro, Clydesdale; D. R. McKenzie, Earltown; John M. Munro, North Earltown; Auditors: D. R. McKenzie, John M. Munro...

North River.—President, R. H. Nelson, North River; Vice-President, A. F. Fulton, North River; Secy-Treasurer, Wm Murray, North River; Directors: Calvin McNutt, Geo. Payne, Wm. Blair, C. C. Douglas, Allison Dickson, North River; Auditors: Stanley Murray, David Upham..

Portaupique.—President, J. N. Brown, Portapique; Vice-President, W. P. Hennessy, Highland Village; Secy-Treasurer, H. A. Baird, Portapique; Directors: Edgar McMullin, Highland Village; W. H. Mahney, Highland Village; Lorne Cook, Portapique; Sam Carr, Wm. Creelman, Portaupique; Auditors: Sam Carr, Wm. Creelman....

Number o Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance
106	241 50	108 45	385 08	432 50	47 42
38	85 50	55 46	322 42	267 99	54 43
37	56 75	45 61	132 68	93 34	39 34
21	42 00	40 67	198 27	234 66	36 39
20	54 00	44 75	109 54	123 18	13 64
16	60 00	46 79	311 90	207 50	104 40
49	71 50	50 71	179 11	224 72	45 61

Springside.—President, Warren Jackson, Newton Mills; Vice-President, G. P. Hamilton, Cross Roads; Secy-Treasurer, F. T. Gammell, Newton Mills; Directors: Lyman Fulton, Newton Mills; Lyman Hamilton, Cross Roads; Jas. Creelman, Springside; D. F. Creelman, Newton Mills; Joe Archibald, Cross Roads; Auditors: Lyman Fulton, Lyman Hamilton..................................

Sterling.—President, Wm. Gray, West New Annan; Vice-President, W. S. Corrall, Avondale; Secy-Treasurer, Isaac Gray, Avondale; Directors: J. S. Murdock, G. R. Marshall, Ira Vincent, West New Annan; Wm. M. Campbell, West New Annan; John Warwick, West New Annan; Auditors: Geo. Gray, Jas. McDougall.....................

Stewiacke.—President, S. T. Gould, Stewiacke East; Vice-President, O. F. Wright, West St. Andrews; Secy-Treasurer, A. D. Fulton, Stewiacke; Directors: Lamont Kent, Stewiacke East; Angus Rose, St. Andrews; W. G. Erwin, R. J. Bates, C. E. Gould, Stewiacke East; Auditors: S. H. Taylor, J. C. Davidson..........................

Tatamagouche.—President, W. B. McLellan, Tatamagouche; Vice-President, G. B. Clarke, Tatamagouche; Secy-Treasurer, J. J. Clarke, Tatamagouche; Directors: James Clark, Tatamagouche; Geo. Tattrie, Lake Road; C. N. Cunningham, Tatamagouche; C. P. Bryden, Geo. Lombard, Tatamagouche; Auditors: Gordon Clark, Jas. Bryden...

Waugh's River.—President, J. W. Blair, Waugh's River; Vice-President, A. W. McLeod, Waugh's River; Secy-Treasurer, J. M. McKay, Waugh's River; Directors: W. M. McKay, J. R. McKay, Geo. W. McKay, Ken Sutherland, Alex. Matheson, Waugh's River; Auditors: Alex. Hayman, Ken R. McKay..............................

CUMBERLAND COUNTY.

Amherst.—President, Norman A. Black, Amherst; Vice-President, Geo. H. Bent, Salem; Secy-Treasurer, C. H. Black, 208 Victoria St., Amherst; Directors: Ernest W, Embree, Amherst R. R. 2: Joseph Black, Amherst R. R. 3; W. W. Embree, Amherst R. R. 1; C. V. Thompson, B. C. Gourley, Fort Lawrence; Auditors: S. Freeman, W. N. Boomer...

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
58	107 00	62 76	259 54	144 81	94 73
43	43 00	41 02	102 82	98 00	4 82
58	186 50	89 77	545 01	331 73	213 28
45	76 50	52 39	233 20	251 34	18 14
25	48 50	42 89	94 66	156 00	61 34
142	365 25	150 49	851 06	836 80	14 26

Beckwith.—President, Wm. Fraser, Beckwith; Vice-President, Vance Mattinson, Beckwith; Secy-Treasurer, Chas. Angus, Carrington; Directors: Chas. Pipley, Mount Pleasant; Albert Fahey, Mount Pleasant; Morton Eaton, R. S. Flinn, R. D. Walker, Beckwith; Auditors: Jerry Matinson, Philip Matinson............................

East Wallace Union.—President, D. G. McKenzie, North Shore; Secy-Treasurer, Stephen Seaman, Lower East Wallace; Directors: Jas. H. Miller, Geo. A. Miller, Lower East Wallace; John C. McKenzie, North Shore, Chas. Carlyle, East Wallace; W. C. Smith, Lower East Wallace; Auditors: W. C. Smith, Chas. Carlyle..................

Fox Harbor.—President, D. M. Bacon, Fox Harbor Point; Vice-President, Lewis Green, Fox Harbor Point; Secretary, W. L. McFarlane, Fox Harbor Point; Treasurer, Stanley Robertson, Fox Harbor Point; Directors; D. R. Stronberry, Fox Harbor; Murray Robertson, Freeman Hartling, Cape Cliff; Thos. McAulay, Fox Harbor; J. A. McFarlane, Fox Harbor Point; Auditors: M. Robertson, J. B. Robertson.................................

Lorneville.—President, W. H. Jackson, Lorneville; Vice-President, Manford Oxley, Tidnish; Secy-Treasurer, Jas. J. Brown, Lorneville; Directors: Earl Jackson, Walter Embree, Allison Baxter, Lorneville; Thos. Ogden, Tidnish; Chas. Ogden, Amherst Beach; Auditors: C. H. Jackson, S. L. Brannan....................................

Malagash.—President, Walter Treen, Blue Sea Corner; Vice-President, J. B. Lombard, Blue Sea Corner; Secy-Treasurer, Arthur Treen, Blue Sea Corner; Directors: Geo. Myers, Malagash Centre; Wm. Treen, Lawrence Treen, Blue Sea Corner; Peter Murray, North Shore; John Purdy, Malagash; Auditors: Jas. Beattie, Peter Murray.........

Middleboro.—President, Asa Stevens, Middleboro; Vice-President, Edward Howard, Middleboro; Secy-Treasurer, G. G. McKim, Hartford; Directors: G. G. McKim, Hartford; C. A. Fountain, Upper Middleboro; Edward Howard, Upper Middleboro, A. W. Nelson, Hartford; David Howard, Middleboro; Auditors: Wm. Howard, Steve Robinson....

Minto.—President, David Bacon, Nappan Station; Vice-President, Henry Donkin, Fenwick; Secy-Treasurer, J. Wellington Lowther, Nappan Station; Directors: F. L. Roach, Herbert Blenkhorn, J. McC. Pipes, Jas. I. Stuart, Nappan Station; J. E. Harrison, Amherst Pt; Auditors: David Bacon, F. L. Roach..........................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts	Total Expenditure	Balance
22	44 00	41 36	205 84	142 15	63 69
22	45 00	41 70	83 84	70 65	13 19
29	43 00	41 02	99 42	120 76	21 34
69	129 00	70 24	308 79	94 07	214 72
29	86 50	55 81	175 58	199 50	23 92
61	75 75	52 15	198 06	157 15	40 91
27	102 00	61 07	204 74	188 75	15 99

Parrsboro.—President, G. H. Jeffers, Lakedale; Vice-President, D. W. Holmes, Cross Roads; Secy-Treasurer, Robie Kirkpatrick, Kirk's Hill; Directors: H. R. Berry, New Prospect; D. O'Regan, Jas. E. Brown, Wm. Murray, Lakedale; Harvey Smith, Parrsboro; Auditors: Henry Fader J. W. Gibson..

Pugwash.—President, J. W. Henderson, Pugwash; Vice-President, Harry Tuttle, Pugwash; Secy-Treasurer, D. J. Mitchell, Pugwash; Directors: J. H. Matheson, Elmer Clark, Gordon Fullerton, Beecher Robertson, C. C. Colburne, Pugwash; Auditors: Ernest D. Mitchell, Hugh Clarke

Shinimicas Bridge.—President, E. E. Fisher, Amherst R. R. 4; Vice-President, Geo. O. Smith, Shinimicas Bridge; Secy-Treasurer, J. C. Brander, Shinimicas Bridge; Directors: L. S. Fisher, Amherst R. R. 4; A. P. Blair, Shinimicas R. R. 1; R. T. Fisher, Amherst R. R. 4; J. A. Moore, Shinimicas Bridge; Geo. O. Smith, Lower Shinimicas Bridge; Auditors: Frank G. Smith, Jas. R. Smith.................

Six Mile Road.—President, L. W. Crowford, R. R. 1 Wallace; Vice-President, Wm. Angivine, R. R. 1 Wallace; Secy-Treasurer, Chas. Seaman, Wallace R. R. 1; Directors: S. R. Coulter, Abram Benjamin, Wesley Coulter, Lemont Keir, Fulton Gullan, Wallace R. R. 1..................

Upper Wentworth.—President, Samuel Little, Wentworth Station; Vice-President, J. N. McNutt, Wentworth Station; Secy-Treasurer, R. C. Swallow, Wentworth Centre; Directors: W. A. Weatherbee, Wentworth; A. M. Ferguson, Wentworth Station; Spencer Little, Stephen Tuttle, Wentworth; Fred Smith, Wentworth Station; Auditors: Rev. C. H. Johnson, W. A. Weatherbee......................

Victoria.—President, David Murphy, Victoria; Vice-President, Wm. VanBuskirk, Streets' Ridge; Secy-Treasurer John W. Crowley, Streets Ridge; Directors: Duncan Ross, Egerton Betts, Clarence Thompson, Dan Crowly, Streets Ridge; Stanley Stuart, South Victoria...........

Wallace Bay.—President, E. E. Peers, Wallace Bay; Vice-President, D. M. Brown, Wallace Bay; Secy-Treasurer, D. F. Clift, Pugwash, R. R. 3; Directors: H. T. Wills, D. M. Brown, L. A. McKim, Stephen Tuttle, W. A. Tuttle, Wallace Bay; Auditors: R. A. O'Brien, Daniel McKim........

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
15	68 00	49 51	163 45	56 13	107 32
27	45 75	41 95	96 71	90 70	6 01
27	57 50	45 94	314 75	193 10	121 65
34	40 00	40 00	New	Society	
24	48 00	42 73	253 28	268 00	14 72
30	45 00	41 70	95 83	90 00	5 83
17	60 50	46 96	109 95	111 18	1 23

Wallace Grant—President, W. J. Stevens, Bay Head R. R. 2; Vice-President, A. G. McIntosh, Bay Head R. R. 2; Secy-Treasurer, A. W. Stevens, Bay Head, R. R. 2; Directors: Chas. McEchron, Wm. McEchron, Garfield Coulter, W. A. Reeves, L. G. Stevens, Bay Head R. R. 2; Auditors: W. M. McFarlane, A. G. McIntosh....................

DIGBY COUNTY.

Belliveau Cove.—President, Lennie Belliveau, Belliveau Cove; Vice-President, Chas. Belliveau, Belliveau Cove; Secy-Treasurer, Antime Doucet, Belliveau Cove; Directors: Alca Belliveau, Damien Doucet, Emilier Le Blanc, Joseph C. Theriault, Augustine Theriault, Belliveau Cove; Auditors: Benjamin Belliveau, Lennie Belliveau..............

Digby Central.—President, J. O. Turnbull, Digby; Vice-President, Jas. Trevoy, Brighton; Secy-Treasurer, Frank W. Nichols, Digby; Directors: Jas. Young, Digby; J. A. Rice, Johnathan Letteney, Digby; J. C. McNeil, North Range; Jacob Trask, Marshalltown.............

Gilbert's Cove.—President, Frederick Sabean, Gilbert's Cove; Vice-President, Andrew Morrisey, Gilbert's Cove; Secy-Treasurer, Joseph Kinney, Gilbert's Cove; Directors: Henry Melanson, Gilbert's Cove; William Brooke, Ashmore; Albert Melanson, Ashmore; Fred L. Manzer, Ashmore; Chas. Kinney, Gilbert's Cove; Auditors: Allan Kinney, Chas. H. Kinney..................................

Hillsburg.—President, J. B. Harris, Bear River; Vice-President, E. Reade, Bear River, Secretary, C. F. McDormand, Bear River; Treasurer, M. R. Kinney, Bear River Directors, H. E. Chisholm, M. E. Harris, H. R. Kinney, Ezra Miller, C. D. Rice, Bear River; Auditors; C. F. McDormand, W. E. Reade..............................

Little Brook.—President, Zozine Comeau, Little Brook; Vice-President, Symphoirin Le Blanc, Little Brook; Secy-Treasurer, Arnaud S. Comeau, Little Brook; Directors: Isaac H. LeBlanc, Church Point; Rupert Cothian, Albame C. LeBlanc, Little Brook; Augustine A. Comeau, Eddie Gaudet, Comeauville; Auditors Camille Comeau, Elithare Dugas...

Rossway.—President, Byron Robbins, Rossway; Vice-President, Caswell Denton, Rossway; Secy-Treasurer, C. W. Cornwell, Rossway; Directors; David Peters, Wm. Hutchins, Israel Banks, W. H. Cossaboom, Oswall Mullin, Rossway; Auditors; H. B. Nichols, Leslie McKay........

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
29	45 50	41 86	205 28	174 74	30 54
41	59 00	46 46	264 28	87 06	177 22
180	256 80	113 65	701 88	528 71	173 17
65	80 20	53 66	126 07	135 55	9 48
75	75 00	51 89	786 00	691 72	95 02
58	75 00	51 89	218 60	186 99	31 61
39	105 50	62 26	New	Society	

St. Mary's.—President, Benjamin Robbins, Centerville; Vice-President, M. Rowlett, Centerville; Secy-Treasurer, Edward McKay, Centerville; Directors: Henry Cossaboom, Geo. Holmes, Haddon Wescott, Amosa Eldridge, Terah Morehouse..............................

GUYSBORO COUNTY.

Aspen.—President, T. A. McKeen, Aspen; Vice-President, H. E. Stewart, Aspen; Secy-Treasurer, Vincent McKean, Aspen; Directors: Jim Tait, Willard McKean, Arch Lawson, Geo. Mitchell, Osburn Cumminger, Aspen; Auditors: E A. McKeen, C. W. Grant..................

Erinville.—President, Patrick Walsh, East Erinville; Vice-President, Wm. McDonald, West Erinville; Secy-Treasurer, Joseph Lawlor, West Erinville; Directors: Wm. O'Neil, John Chisholm, Salmon River Lakes; Michael Flynn East Erinville; John Morrison, Richard White, East Erinville; Auditors: Wm. McKinnon, Michael Flynn.........

Fisher's Mills —President, Gilbert Cameron, Aspen; Vice-President, Judson McKean, Aspen; Secy-Treasurer, Wm H Mitchell, Aspen; Directors: E E McKean, John D McKean, Dougall Cameron, D C Fisher, Thos C McKean, Aspen; Auditors: Isaac Fisher, Isaac McKean..

Glenelg —President, David Whidden, Glenelg; Vice-President, A G Archibald, Glenelg; Secy-Treasurer, A H McKeen, Glenelg; Directors: A G Lawson, Melrose; J J Kirk, A D Archibald, R B Mills, Glenelg; J D Kirk, Aspen; Auditors: W G Jordan, A G Lawson...........

Goshen —President, Andrew Sinclair, Goshen; Vice-President, Jas A Sinclair, Goshen; Secy-Treasurer, Alex Sinclair, Goshen; Directors: W H Sinclair, Leonard Sinclair, J F Forbes, Alfred Forbes, Wm McIntosh, Goshen; Auditors: A F McNaughton, John A Sinclair...........

Guysboro —President, J A Fulton, Guysboro; Vice-President, C E Cook, Guysboro; Secy-Treasurer, H M Scott, Guysboro; Directors: Em Johnson, Roachvale; John E Dillon, Guysboro; J C Jones, Guysboro, Stephen Grant, Roachvale..............................

Number of Members-	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
73	103 00	61 40	563 87	379 55	184 32
16	40 00	40 00	New	Society	
22	40 40	40 14	170 77	93 40	77 37
27	45 00	41 70	New	Society	
23	40 00	40 00	125 11	54 00	71 11
30	46 50	42 21	136 39	94 64	51 75
70	105 00	62 09	319 45	280 44	39 01

Intervale —President, W G Aikins, Guysboro Intervale; Vice-President, Jas Whall, Guysboro Intervale; Secy-Treasurer, Bruce Ferguson, North Intervale; Directors: Wm F Aikins, Guysboro Intervale; W A McKenzie, Heber Ferguson, North Intervale; John C McPherson, David Cameron, Guysboro Intervale; Auditors: Wm C Chisholm, Earl F Aikins............................

Lakedale and Giant's Lake —President, J J McNeil, Giant's Lake; Vice-President, Michael McIsaac, Giant's Lake; Secy-Treasurer, Ronald McIsaac, Giant's Lake; Directors: Don A McIsaac, John C McIsaac, Giant's Lake; Rod McLean, T W Kennedy, Lake Dale; Auditors: Angus D McIsaac, Ronald McLean....................

Manchester —President, D F Connolly, Manchester; Vice-President, Fenwick Scranton, South Manchester; Secy-Treasurer, Stanley Lipsett, Manchester; Directors: John C Lipsett, E M Tory, Milton Simpson, Harry Simpson, Manchester; Fenwick Scranton, South Manchester........

New Harbor —President, Baxter Sangster, New Harbor, Vice-President, Townshend Sangster, New Harbor; Secretary, Jas S Sponagle, New Harbor; Treasurer, Everett Gillis, Upper New Harbor; Directors: Geo M Gillis, Herbert Gillis, Fred P Sangster, John M Sangster, Ernest Gillis, New Harbor..................................

New Town —President, Robt Archibald, New Town; Vice-President, Tom Fisher, New Town; Secy-Treasurer, W H Archibald, New Town; Directors: Henry McInnis, Baxter Cameron, Wesley McKay, Vincent McLean, J T Bain, New Town; Auditors: Tom Bain, Wm Williams....

Port Hilford and Wine Harbor—President, John R Hurst, Port Hilford; Vice-President, John R Kinley, Port Hilford; Secy-Treasurer, Fred Ll Hewett, Port Hilford; Directors: Moses W Mugford, Austin Pickett, Port Hilford; Fred C Bennett, Indian Harbor Lake; G A Hirschfield, Wine Harbor; David C Flemming, Wine Harbor; Auditors: Geo H Hurst, Jas Finde...........................

Stillwater —President, H A McLeod, Stillwater; Vice-President, J K McKean, Stillwater; Secretary, W A McDonald, Stillwater; Directors: Lochlan Fraser, Goldenville; Murdock Whitman, Sherbrooke; W, B Fraser, R J Weir, Stillwater; D J Archibald, Stillwater.................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
43	54 00	44 76	155 52	161 81	6 29
23	41 20	40 41	179 28	156 28	23 00
81	94 50	58 51	248 18	214 47	33 71
43	43 00	41 02	New	Society	
35	70 50	50 36	150 50	177 62	27 12
44	50 00	43 40	102 57	46 52	56 05
29	42 00	40 67	322 65	285 50	37 15

HALIFAX COUNTY.

Dartmouth —President, Maynard Tulloch, Dartmouth, Vice-President, W W Peverill, Dartmouth; Directors; Secy-Treasurer, Edward Morash, Dartmouth; Directors: C J Keeler, Dartmouth; Newton Keeler, Henry Baker: J R Morash, Webster Eisner, Woodlawn; Auditors: Frank Settle, Fred Settle..............................

Eastern Star —President, Jas H Thomas, Preston; Vice-President, Seymour Lapire, Preston; Secretary, W B Thomas, Preston; Treasurer, Samuel Williams, Preston; Directors: Peter Williams, Joseph Gentles, John Brooks, Geo, Williams, Preston; Auditors: Chas Johnson, Geo Williams...

Elderbank —President, Robt S Ogilvie, Elderbank; Vice-President, Norman Dares, Elderbank; Secy-Treasurer, H E Cole, Elderbank; Directors: Norman Cruickshank, Henry Grant, Maurice Cole, John Ogilvie, Morton McMullin, Elderbank; Auditors: Henry Grant, Chas Ogilvie....

Halifax —President, R H Edwards, 36 Brenton St , Halifax; Vice-President, John MacAlloney, Fairview; Secretary; H H Blois, 365 Quinpool Road, Halifax; Treasurer, R Duggan, 252 Robie St., Halifax; Directors: G. Creighton, G. R. Marshall, R. Duggan, F. W. Bowes, Halifax; Auditors: F. Edwards, R. H. Skinner.......................

Middle Musquodoboit.—President, Samuel Crockett, Middle Musquodoboit; Vice-President, Sidney McKeen, Brookvale; Secy-Treasurer, L. L. Archibald, Mid. Musquodoboit; Directors: Roy B. McCurdy, Mid. Musquodoboit; John B. Archibald, Brookvale; Ed. McFatridge, Jas. A. Sedgewick, Adams Archibald, Mid. Musquodoboit; Auditor: Sidney Lindsay...........................

Musquodoboit Harbor.—President, W. S. Ritcey, Musquodoboit Harbor; Vice-President, Geo. Landels, Musquodoboit Harbor; Secy-Treasurer, S. Sutherland, Musquododoboit Harbor; Directors: Jas. A. Ritcey, Musquodoboit Harbor; Jas. A. Rollings, Musquodoboit Harbor; Oswald Mosher, Smith Settlement; Alex. Slade, R. J. Stoddard, Musquodoboit Harbor...........................

Seaside.—President, Norman Hiltz, West Lawrencetown; Vice-President, Freeman S. Sellars, West Lawrencetown; Directors: Morris Conrad, Wm. Robinson, West Lawrencetown., Isaac Sellars, West Lawrencetown........

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
35	92 00	57 67	212 11	127 11	85 00
28	62 00	47 48	108 06	104 50	3 56
17	66 00	48 83	173 41	137 09	36 32
35	45 00	41 70	590 20	247 15	343 05
82	199 00	94 01	441 03	394 25	46 78
51	84 00	54 95	159 30	116 30	43 00
15	40 00	40 00	158 38	157 80	58 00

HANTS COUNTY.

Avon.—President, David Withrow, Newport Landing; Vice-President, Lennie Parker, Newport Landing; Secy-Treasurer, B. E. Mosher, R. M. D. 2, Newport; Directors: Wm. B. Wallace, Newport Landing; Jerry Parker, B. E. Mosher, Wm. Withrow, Joseph Benedict, Jr., Newport Landing; Auditors: Geo. Allison, Freeman Connors......

Burlington.—President, R. P. Harvie, Burlinfton; Vice-President, Alonzo Harvie, Burlington; Secy-Treasurer, Robie C. Sanford, Burlington; Directors: Clarence Harvie, Jas. Sanford, Welsford Salter, Daniel Young, Douglas Harvie, Burlington; Auditors: Harvie Lynch, Alonzo Harvie..

Fenwick —President, Seymour Main, Noel Shore; Vice-President, O J O'Brien, Noel; Secretary, Isaac H Densmore; Burncoat; Treasurer, Sidney O'Brien, Noel; Directors: Wilbert McCulloch, Noel Shore; Morris Densmore, East Noel; Selwyn O'Brien, Morton Faulkner, Noel; Fred Crowe, Burncoat ....

Gore —President, W L Wallace, West Gore; Vice-President, W B MacDougall, West Gore; Secy-Treasurer, H. B MacDougall, West Gore; Directors: Esson McDougall, H H Brown, Seymour Wallace, West Gore; Ansel Scott, Gore; Essom Williams, Riverside Corner; Auditors: E M MacDougall, Fred Sumner ....

Hantsport —President, Gordon McKeen, Hantsport; Vice-President, S P Schurman, Mount Denson; Secy-Treasurer, Roy A Davis, Mount Denson; Directors: Wm Riley, M E Caldwell, Mount Denson: Thos Trefry, Hantsport; Auditors: S P Schurman, Wm Whitman ....

Maitland —President, Thos C Smith, Maitland; Vice-President, Herbert Eaton, Maitland, Secy-Treasurer, W F Roy, Maitland; Directors: John Carr, Lawson Hayes, Herbert Eaton, Capt Geo Douglas, Duncan MacDougall, Maitland; Auditors: Wm McKenzie, Duncan McDougall..

Meander —President, Fred Cameron, Newport; Vice-President, J M Harvey, Brooklyn; Secy-Treasurer, Morris Dill, Newport; Directors: Earl Lunn, Walter Lockhart, Howard Harvey, Herbert Robinson, William Hennessy, Brooklyn.......................................

Number of Members	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
29	153 00	78 38	368 69	316 65	51 95
24	50 50	43 57	267 94	145 24	122 70
44	85 00	55 30	185 90	249 00	63 10
17	71 50	50 70	189 26	72 18	117 08
52	88 00	56 31	262 70	247 50	15 20
23	40 00	40 00	282 76	135 00	147 76
15	40 50	40 20	233 36	165 85	67 51

Progress —President, Geo Wright, Elmsdale; Vice-President, E G McMillan, Elmsdale; Secy-Treasurer, H Fraser, Elmsdale; Directors: Geo Fraser, Joseph Flemming, Jacob Gilby, Frank McDonald, Harry Bowlston, Elmsdale; Auditors: G E McMillan, Gordon Casey...............

Scotch Village —President, B Anthony, Mosherville; Vice-President, H W Dimock, Scotch Village; Secy-Treasurer, L M Smith, Scotch Village; Directors: Henry Macumber, Percy Cochrane, O G Walley, Scotch Village; Leslie Barkhouse, Upper Burlington; Robie L Harvie, Mosherville; Auditors: H W Dimock, Harry Cochrane....

Selmah —President, A M Anthony, Maitland; Vice-President, Robt Cox, Sterling Brook; City-Treasurer, Harold Fiske, Selmah; Directors: C A Putnam, Geo McDuffie, Cyrus Weldon, Osmond Sterling, Selmah; Harry Densmore, Sterling Brook; Auditors: J J McLean, G B McDougall..................................

Shubenacadie —President, Jas McKenzie, Shubenacadie; Vice-President, Harry Stewart, Shubenacadie; Secretary, A H Snide, Shubenacadie; Treasurer, E M Davis, Shubenacadie; Directors: Thos Blackburn, Allison McDonald, Edwin Wardrobe, David Moore, W D Bowers, Shubenacadie; Auditors: Jas A Kirkpatrick, W Smith......

Windsor —President, Wm O'Brien, Windsor Forks: Vice-President, Winburn Saunders, Martock; Secretary; Geo W DeWolfe, Three Mile Plains; Treasurer: G B O'Brien, Windsor Forks; Directors: Jas Vaughn, Geo Haley, L J Millett, Thos Aylward, Geo Wilson, Windsor Forks; Auditors: Clarence Reddan, Campbell McNeil....

INVERNESS COUNTY.

Ainslie —President, Malcolm A McMillan, East Lake Ainslie; Vice-President, David Mutch, East Lake Ainslie; Secretary, Malcolm C McMillan, East Lake Ainslie; Treasurer, Malcolm N McKinnon, East Lake Ainslie; Directors: Dan C McDonald, East Lake Ainslie; D A McKinnon, Kirkwood; Dan McLean, Dan J McKay, Archie McKinnon, East Lake Ainslie...................

Belle Cote —President, John D Doucet, Belle Cote; Vice-President, Geo T Munro, Belle Cote; Secy-Treasurer, John A McLellan, Belle Cote; Directors: Arch D McLellan, Patrick LeBlanc, Marcellin Chiasson, Constant AuCoin, Thos, B Shaw, Belle Cote; Auditors: Chas Doucet, John F LeBlanc....................................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
37	75 75	52 13	260 67	171 38	89 29
30	72 50	51 04	205 46	198 37	7 09
36	77 00	42 57	268 68	121 40	147 28
106	300 50	128 51	825 27	511 50	313 77
87	453 00	180 29	853 10	696 00	157 10
18	42 75	40 93	New	Society	
53	67 20	49 24	109 75	123 25	13 50

Black River —President, A D Beaton, Gelnora Falls; Vice-President, Jas Beaton, Beatonville; Secy-Treasurer, A J Campbell, Beatonville; Directors: John A Campbell, Glenora Falls; M F Campbell, Angus Beaton, Arch Campbell, Beatonville; Auditors: A R Campbell, B McKinnon, Beatonville..

Cheticamp —President, Baptiste Lefort, Point Cross; Secy-Treasurer, Patrick Cormier, Point Cross; Directors: John Cormier, Emilirm Cormier, Paul Deveraux, Chas AuCoin, Delfin Deveraux, Point Cross; Auditors: Philippe LeBlanc, Chas St Lafort...........................

Emerald —President, Alex Miller, Emerald; Vice-President, Nicholas Coady, Emerald; Secy-Treasurer, Jas P Tompkins, Emerald; Directors: John A Dunn, John I Murphy, Jas R Murphy, Frank Benoit, Emerald; Hugh S McLellan, S W Margaree; Auditors; Alex Miller, John I Murphy...

East Margaree —President, J R LeBlanc, East Margaree; Vice-President, Jas D LeBlanc, East Margaree; Secy-Treasurer, Rev. Dr. R. McDonald, P. P., East Margaree; Directors: P. J. LeBlanc, D. P. LeBlanc, Paul Doucet, J. C. LeBlanc, East Margaree..........................

Glenville —President, Alex McDonald, Strathlorne; Vice-President, Neil D McInnis, Glenville; Secy-Treasurer, J J McLellan, Glenville; Directors: Rev J M McLean, John H McKinnon, Dan C McKinnon, Strathlorne; D D McLellan, Neil D McIsaac, Glenville; Auditors: D A McLellan, A D McLellan..............................

Inverness —President, Arch J McIsaac, Inverness; Vice-President, Geo F Cameron, Inverness; Secy-Treasurer Dan A McIsaac, Inverness; Directors: A J McLellan, H L McDougall, J M McLeod, John A Beaton, Inverness; Auditors: Rev A. L. McDonald, P.P., W. D. Lawrence

Judique —President, John Archie McDonnell, Judique Intervale; Vice-President, Hugh Gillis, Judique North; Secy-Treasurer, John D McLellan, Judique North; Directors: John D McMaster, Neil S McIsaac, Judique North; John A McDonald, Judique; Angus McDougall, Judique Intervale; Auditors: Neil S McIsaac, Angus J McDougall.

Margaree Forks —President, John J Coady, Margaree Forks; Vice-President, Peter McDaniel, Margaree Forks; Secy-Treasurer, Duncan McDonald, Margaree Forks; Directors: A W Chisholm, Gabriel Chiasson, Peter J Coady, Chas Miller, John A Chiasson.......................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
17	46 00	42 03	141 37	140 50	87
27	188 85	90 58	625 46	467 60	157 86
46	97 00	59 40	257 93	99 00	148 93
20	60 00	46 77	169 13	152 92	16 21
34	72 50	51 07	143 97	150 46	6 49
16	40 00	40 00	113 59	85 85	27 74
17	42 00	40 68	95 04	99 17	4 13

Morar.—President, Angus Brown, Livingston Cove; Vice-President, John J. McPherson, Livingstone Cove; Secy-Treasurer, Alex. J. Gillis, Morar; Directors: Allan Adams, John McMullin, Jas. McDougall, Wm. McEchern, Livingston Cove; Daniel Nickerson, Morar......

McAra's Brook.—President, Wm. B. McGillvray, McAra's Brook; Vice-President, John D. McPherson, McAra's Brook; Secy-Treasurer, John W. McAdam, McAra's Brook; Directors: John A. McPherson, John D. Smith, John R. McAdam, McAra's Brook; Auditors: John H. McEchern, John D McLeod..................................

North Grant.—President, George Sutton, Antigonish; Vice-President, Frank Chisholm, Antigonish; Secy-Treasurer, W. A. Chisholm, Box 404, Antigonish; Directors: R. Chisholm, Bailey Brook; John C. Chisholm, Bailey Brook Laughlin, McLellan, John Grant, North Grant; Chisholm Grant, Clydesdale; Auditors: Joe Grant, Geo. Sutton.....

Ohio.—President, Alex. Chisholm, Ohio; Vice-President, John I McGillvray, Ohio; Secy-Treasurer, Hamish Sutherland, Ohio; Directors: John McDonald, Peter McLean, Dan McIsaac, D. A. McMillan, Ronald McDonald, Ohio; Auditors, Angus McInnis, Ronald McDonald......

Pleasant Valley.—President, Dan McIsaac, Pleasant Valley; Vice-President, Dan Cameron, Pleasant Valley; Secy-Treasurer, R. M. McDonald, Pleasant Valley; Directors: Angus D McGillvray, Dougald J. McGillvray, Colin McGillvray, Angus D. McEchern, Pleasant Valley; Auditors: A. D. McGillvray, Ronald McIsaac.................

Pomquet.—President, Edmund Deon, Pomquet; Vice-President, Xavier Doiron, Monk's Head; Secy-Treasurer, E. A. Doiron, Pomquet; Directors: C. H. Landry, Pomquet; C. H. Landry, Pomquet; Joe Landry, Andrew Benoit, Wm. Landry, Thos. Landry, Pomquet Station; Auditors: Joe Benoit, Henry G. Landry.........................

St. Andrews.—President, James R. Chisholm, Maryvale; Vice-President, John C. Chisholm, St. Andrews; Secy-Treasurer, Rev. A. J. Chisholm, St. Andrews; Directors: Angus A. McDonnell, Glenroy; Robt. Chisholm, Allan McDonald, Hugh J. McDonald, Hugh A. McGillvray, St. Andrews; Auditors: Dan A. Boyd, John C. Chisholm.......................................

Number of Members-	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
22	43 45	41 15	90 07	90 07	
16	43 30	41 12	116 00	94 80	21 20
35	63 00	47 82	153 28	78 60	74 68
16	48 00	42 72	New	Society	
20	42 00	40 68	179 38	171 51	7 87
44	213 61	80 68	312 52	268 40	44 12
22	45 25	41 79	168 97	155 05	13 92

South River.—President, Malcolm Sinclair, Fraser's Mills; Vice-President, D. J. McDonald, Fraser's Mills; Secy-Treasurer, D. D. McGillvray, McPherson's P. O.; Directors: John D. Cameron, D. W. Chisholm, McPherson's P. O.; Duncan McDonald, A. J. McDonnell, D. R. McDonnell, Fraser's Mills; Auditors, Jas. D. Boyd, Andrew McDonald..

South River and Loch Katrine.—President, John A. McMillan, Upper South River; Vice-President, J. F. McNaughton, Loch Katrine; Secy-Treasurer, John A. Cameron, Loch Katrine; Directors: John H. McDonald, Angus A. McDonald, A. H. McPherson, Upper South River; J. H. Kennedy, A. D. McIntosh, Loch Katrine; Auditors: A. D. McPherson, H. McGregor......................

South Side Cape George.—President, J. F. McEchern, Ballentyne Cove; Vice-President, Duncan Gillis, Cape George; Secy-Treasurer, John M. McEachern, Cape George; Directors: Wm. McPhie, C. J. McEchern, Wm. McInnis, Cape George; Alex. McInnis, Ballentyne's Cove; Colin McDonald, Ballentyne Cove........................

South Side Harbor.—President, R. Fraser, S. S. Harbor; Vice-President, Ronald Cameron, Lower South River; Secy-Treasurer, Allan McDonald, South River Station; Directors: D. McDonald, Colin Chisholm, J. C. Crosby, W. R. Chisholm, R. McDonald, South Side Harbor; Auditors: Alex. Cameron, Rod. Chisholm...................

Tracadie.—President, Joseph Landry, Tracadie; Vice-President, Ambrose Connors, Bayfield; Secy-Treasurer, W. H. Delorey, Tracadie; Directors: Jas. McMullin, Bayfield; Jas. Riley, Tracadie, Angus Pettipas, Tracadie; Wm. Wallace, Big Tracadie; John Torpey, Afton; Auditors: Peter Landry, Richard McMillan......................

West River.—Dan J. McDonald, Purl Brook; Vice-President, Alex. Kennedy, Purl Brook; Secy-Treasurer, Ronald C. McGillvray, Geln Road; Directors: Thos. Eldridge, Alex. Kirk, Alex. Kennedy, Angus D. McDonald, Purl Brook; Frank McNaughton, Salt Springs; Auditors: Alex. Kirk, Thos. Ethridge...............................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
24	62 50	47 53	209 62	189 62	20 00
25	69 00	50 23	165 39	168 50	3 11
23	41 00	40 33	84 89	82 20	2 69
21	46 00	42 03	119 20	117 50	1 70
41	138 00	72 74	355 44	159 59	139 85
34	97 25	59 47	146 91	587 17	440 26

CAPE BRETON COUNTY.

Edwardsville.—President, Thos. Rudderham, Edwardsville; Vice-President, S. R. Lewis, Edwardsville; Secy-Treasurer, Jas. Keating, Edwardsville; Directors: Ernest Fraser, Edwardsville; Wallace Lewis, Point Edward; J. B. Lewis, Edwardsville; Stanley Lewis, Tom Roberts, Edwardsville; Auditors: Harry Lewis, Leonard Lewis........

East Bay.—President, J. H. McDonald, East Bay; Vice-President, Peter Gillis, East Bay; Secy-Treasurer, Rev. J. W. McIsaac, P. P., East Bay; irectors: Angus McGillvray, North Side East Bay; Dan R. McIsaac, East Bay; Neil McNeil, East Bay; Angus J. McEachern, Glen Morrison, Angus McIsaac, East Bay....................

Grand Mira.—President, Michael D. Currie, Grand Mira South; Vice-President, Joseph McKinnon, Grand Mira South; Secy-Treasurer, Leo Campbell, French Road; Directors: J. J. Gillis, Neil J. Gillis, Archie L. Gillis, Alex. J. Gillis, Grand Mira South; Auditors: John A. Gillis, Neil G. Gillis..

George's River.—President, E. J. Johnstone, George's River; Vice-President, Peter Almon, George's River; Secy-Treasurer, A. B. McPhee, Leitche's Creek Station; Directors: Thos. Dobson, Harry Carmichael, John P. Harvey, Wilson Gillis, George's River; Geo. H. Young, George's River Station; Auditors: Luke Day, John McMullin..........

Groves Point.—President, H. A. Moffatt, Groves Point; Vice-President, L. L. Oliver, Groves Point; Secy-Treasurer, Jas. Stuart, Groves Point; Directors: Rod Campbell, Hillside; Dan McKenzie, Hillside; Jas. McLeod, Groves Point; Alex. McKay, J. R. Bain, Groves Point; Auditors: Rod Campbell, Jas. McLeod..........................

Homeville and Mira Bay.—President, Ronald McKeigon Catalone; Vice-President, Harry Dillon, Round Island; Secy-Treasurer, Chas. Spencer, Mira Gut; Directors: Everett Spencer, Herbert Spencer, D. J. Martel, Wesley Micoll, Mira Gut; Chas. Dillon, Round Island; Auditors: Harvey Dillon, Donald McInnis..........................

Little Bras D'Or.—President, Parker M. Rice, George's River; Vice-President, Robt. Moffatt, Little Bras D'Or; Secy-Treasurer, W. W. Johnston, North Sydney; Directors: Thos. Lawley, North Sydney; W. J. Moffatt, Little Bras D'Or; Chas. Johnston, Levi Hull, North Sydney; Geo. Howatson, Little Bras D'Or; Auditors: Lloyd McKay Johnston, Chas. Johnston..........................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
26	68 50	49 69	151 78	111 75	40 03
20	40 00	40 00	236 29	146 09	90 20
18	43 00	41 02	83 70	25 25	58 45
37	55 75	45 36	291 97	269 85	22 12
22	44 00	41 36	100 30	80 75	19 55
15	45 00	41 70	171 10	140 55	30 55
35	48 00	42 73	215 49	107 45	108 04

North Sydney.—President, J. Webster Allen, North Sydney; Vice-President, John Musgrave, North Sydney; Secretary, Neal Benton, North Sydney; Treasurer, John McQueen, North Sydney; Directors: Kenneth Gordon, C. A. Munn, C. Lemoine, Harry Moore, Stanley Green, North Sydney; Auditors: L. H. Moffatt, A. K. Jackson....

Salem Road.—President, N. J. McDonald, Enon; Vice-President, John A. McDonald, Lake Uist; Secy-Treasurer, A. J. McCuish, Lake Uist; Directors: John W. McDonald, Salem Road; D. A. McDonald, Terra Nova; Angus McCuish Big Glen; Alex. McDonald, Enon; D. A. McKinnon, Big Glen; Auditors: R. W. Munro, Angus McDonald..........

South Bar—President, A. R. Richardson, South Bar; Vice-President, A. J. McLeod, South Bar; Secy-Treasurer, F. A. McInnis, Whitney Pier, Sydney; Directors: Howard Richardson, Abner McLennan, Rodk. McLennan, F. A. Richardson, Percy Richardson, South Bar; Auditors: Y. H. Barrington, Edward Murphy........................

Sydney Forks.—President, Rod McRae, Sydney Forks; Vice-President, Neil McNeil, Sydney Forks; Secy-Treasurer Gus B. McDonald, Sydney Forks; Directors: Michael P. Gillis, Meadows; Dan McAdam, Meadows; Melanson Smith, Sydney Forks, Robt. McDonald, Sydney Forks; Angus L. McDonald, Sydney Forks; Auditors: Neil McNeil, Robt. McDonald..................................

COLCHESTER COUNTY.

Agricola.—President, Adam Bently, Otter Brook; Vice-Pres. H. M. Smith, Otter Brook; Secretary, H. C. Dunlap, Otter Brook; Treasurer, J. S. Dunlap, Mid. Stewiacke; Directors: Hedley Creelman, Otter Brook; Clifford Sell, Mid. Stewiacke; J. D. Dunlap, Mid. Stewiacke; C. C. Cox, Upper Stewiacke; C. B. Bentley, Mid. Stewiacke; Auditors: Hedley Creelman, J. D. Dunlap......................

Annan.—President, Angus Murray, Tatamagouche Mountain; Vice-President, Wm. Baillie, South Tatamagouche; Secy-Treasurer, H. B. Cock, South Tatamagouche; Directors: Malcolm Thompson, Central New Annan; Arthur Tucker, Tatamagouche Mountain; John Baillie, Kavanagh Mills; Jerdon Thompson, Tatamagouche Mountain, Albert Cock, East New Annan; Auditors: Malcolm Thompson, Jerdon Thompson........................

Number of Members	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
42	137 00	72 95	245 78	227 78	18 00
73	285 00	123 21	531 47	531 47	
19	57 00	45 78	129 30	144 00	14 70
22	44 00	41 36	120 50	43 00	77 50
46	117 50	63 34	200 37	294 97	94 60
26	43 20	41 09	175 08	202 19	27 11

Balmoral Mills.—President, R. D. McKay, Balmoral Mills; Vice-President, Alex. S. McKay, Balmoral Mills; Secy-Treasurer, John Munro, Balmoral Mills; Directors: Geo. S. Baillie, Hugh W. McKay, Peter A. McDonald, John A. Fergusin, R. D. McKay, Balmoral Mills; Auditors: Geo. Baillie, Hugh McKay........................

Bass River.—President, J. H. Fulton, Bass River; Vice-President, S. H. Fulton, Little Bass River; Secy-Treasurer, Jas. H. Fulton, Bass River; Directors: D. H. Lank Upper Bass River; S. H. Fulton, Little Bass River; Wm. Starratt, Upper Bass River; Capt. E. Thompson, Bass River; Burton Densmore, Upper Economy; Auditors: Amos Fulton, Capt. E. Thompson..................................

Bay Head.—President, Sidney Clark, Bayhead R. R. I; Vice-President, Walter Ross, Bayhead, R. R. I; Secretary, J. L. Cunningham, Bayhead R. R. I.; Treasurer, A. S. McDonald, Bayhead, R. R. I; Directors: Arthur Upham, A. R. Langille, Harry Holmes, David Roberts, Sam Matattall, Bayhead R. R. I; Auditors: Wm. Millard, Geo. Dunphey.......................................

Brookfield.—President, J. T. Bell, Brookfield; Vice-President, Walter Ross, Brookfield; Secy-Treasurer, Elwood, McLellan, Brookfield; Directors: Melville Carter, T. D. Bates, Percy Bentley, Fred Lockhart, Albert Bower, Brookfield; Auditors: E. D. Benjamin, J. J. Hamilton..

Brule Shore.—President, R. D. Malcolm, R. R. 1; Tatamagouche; Vice-President, Noah Jollimore, Tatamagouche, R. R. 1; Secy.-Treas., Jas. S. Read, R. R. 1, Tatamagouche; Directors: Noah Jollimore, Alex. McKinnon, Geo. Dunn, A. P. Semple, Geo. Fraser, Tatamagouche, R. R. 1; Auditors: Geo. Dunn, Noah Jollimore..........

Dairy.—President, John A. Wilson, Central New Annan; Vice-President, Geo. R. Miller, Central New Annan; Secy-Treasurer, C. J. Cock, Central New Annan; Directors: Geo. R. Miller, John C. Bell, West New Annan; Ira Nelson, Tatamagouche; Alex, M. Swan, Central New Annan; H. H. McNutt, Tatamagouche Mountain...................

Earltown.—President, Geo. McIntosh, Earltown; Vice-President, John A. Murray, Earltown; Secy-Treasurer, R. E. McKay, Earltown; Directors: W. D, McKay, John A. Murray, J. R. Gunn, Thos. McKay, Earltown; Auditors: John A. Murray, Geo. McIntosh.....................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
27	40 50	40 20	226 93	186 31	40 62
30	74 50	51 74	164 78	161 00	3 78
25	55 00	45 00	117 36	76 50	40 86
39	100 25	60 49	257 64	174 40	83 24
32	63 00	47 81	144 78	89 30	55 48
27	40 50	40 20	212 55	199 65	12 90
22	44 00	41 36	88 52	89 62	1 10

Farmers.—President, Murray Currie, Londonderry Station; Vice-President, Robie McKay, Londonderry Station; Secy-Treasurer, Harvey Gray, East Mines Station; Directors: W. P. Weatherbee, E. A. McLean, Geo. Dill, W. E. McLean, E. C. Fletcher, Glenholme; Auditors: R. McKay, W. E. McLean..............................

Londonderry.—President, W. W. Blanchard, Glenholme Vice-President, Ernest McCully, Masstown; Secretary, T. W. Morrison, Glenholme; Treasurer, Harvey Gray, Glenholme; Directors: Capt. A. McNutt, Chas. Vance, Stephen Jennings, Masstown; M. N. Reid, Glenholme; Gordon Wyllie, DeBert; Auditors: Arthur Putnam, Fowler Fletcher...

Middleton.—President, David McLeod, Denmark; Vice-President, Robt. Wilson, Denmark; Secy-Treasurer, Oliver Stevenson, Denmark; Directors: Robt. Wilson, John Langille, Jas. Hogan, Seldon Swan, Livingston Cameron, Denmark; Auditors: Seldon Swan, Wm. Mingo..........

Millburn.—President, John Bonyman, Millburn; Vice-President, Walter Langille; Secy-Treasurer, Henry W. Swan, Millburn; Directors: Thos. Chalmer, Arthur Byers, Aubrey Byers, John Hutcheson, A. W. Swan, Millburn....

North Earltown.—President, Wellington Ross, North Earltown; Vice-President, Wm. M. Stewart, North Earttown; Secy-Treasurer, Alex. W. McKay, North Earltown; Directors: Daniel G. Ross, North Earltown; David Munro, Clydesdale; D. R. McKenzie, Earltown; John M. Munro, North Earltown; Auditors: D. R. McKenzie, John M. Munro...

North River.—President, R. H. Nelson, North River; Vice-President, A. F. Fulton, North River; Secy-Treasurer, Wm Murray, North River; Directors: Calvin McNutt, Geo. Payne, Wm. Blair, C. C. Douglas, Allison Dickson, North River; Auditors: Stanley Murray, David Upham..

Portaupique.—President, J. N. Brown, Portapique; Vice-President, W. P. Hennessy, Highland Village; Secy-Treasurer, H. A. Baird, Portapique; Directors: Edgar McMullin, Highland Village; W. H. Mahney, Highland Village; Lorne Cook, Portapique; Sam Carr, Wm. Creelman, Portaupique; Auditors: Sam Carr, Wm. Creelman....

Number o Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance
106	241 50	108 45	385 08	432 50	47 42
38	85 50	55 46	322 42	267 99	54 43
37	56 75	45 61	132 68	93 34	39 34
21	42 00	40 67	198 27	234 66	36 39
20	54 00	44 75	109 54	123 18	13 64
16	60 00	46 79	311 90	207 50	104 40
49	71 50	50 71	179 11	224 72	45 61

Springside.—President, Warren Jackson, Newton Mills; Vice-President, G. P. Hamilton, Cross Roads; Secy-Treasurer, F. T. Gammell, Newton Mills; Directors: Lyman Fulton, Newton Mills; Lyman Hamilton, Cross Roads; Jas. Creelman, Springside; D. F. Creelman, Newton Mills; Joe Archibald, Cross Roads; Auditors: Lyman Fulton, Lyman Hamilton................................

Sterling.—President, Wm. Gray, West New Annan; Vice-President, W. S. Corrall, Avondale; Secy-Treasurer, Isaac Gray, Avondale; Directors: J. S. Murdock, G. R. Marshall, Ira Vincent, West New Annan; Wm. M. Campbell, West New Annan; John Warwick, West New Annan; Auditors: Geo. Gray, Jas. McDougall.....................

Stewiacke.—President, S. T. Gould, Stewiacke East; Vice-President, O. F. Wright, West St. Andrews; Secy-Treasurer, A. D. Fulton, Stewiacke; Directors: Lamont Kent, Stewiacke East; Angus Rose, St. Andrews; W. G. Erwin, R. J. Bates, C. E. Gould, Stewiacke East; Auditors: S. H. Taylor, J. C. Davidson........................

Tatamagouche.—President, W. B. McLellan, Tatamagouche; Vice-President, G. B. Clarke, Tatamagouche; Secy-Treasurer, J. J. Clarke, Tatamagouche; Directors: James Clark, Tatamagouche; Geo. Tattrie, Lake Road; C. N. Cunningham, Tatamagouche; C. P. Bryden, Geo. Lombard, Tatamagouche; Auditors: Gordon Clark, Jas. Bryden.......................................

Waugh's River.—President, J. W. Blair, Waugh's River; Vice-President, A. W. McLeod, Waugh's River; Secy-Treasurer, J. M. McKay, Waugh's River; Directors: W. M. McKay, J. R. McKay, Geo. W. McKay, Ken Sutherland, Alex. Matheson, Waugh's River; Auditors: Alex. Hayman, Ken R. McKay.............................

CUMBERLAND COUNTY.

Amherst.—President, Norman A. Black, Amherst; Vice-President, Geo. H. Bent, Salem; Secy-Treasurer, C. H. Black, 208 Victoria St., Amherst; Directors: Ernest W, Embree, Amherst R. R. 2: Joseph Black, Amherst R. R. 3; W. W. Embree, Amherst R. R. 1; C. V. Thompson, B. C. Gourley, Fort Lawrence; Auditors: S. Freeman, W. N. Boomer......................................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
58	107 00	62 76	259 54	144 81	94 73
43	43 00	41 02	102 82	98 00	4 82
58	186 50	89 77	545 01	331 73	213 28
45	76 50	52 39	233 20	251 34	18 14
25	48 50	42 89	94 66	156 00	61 34
142	365 25	150 49	851 06	836 80	14 26

Beckwith.—President, Wm. Fraser, Beckwith; Vice-President, Vance Mattinson, Beckwith; Secy-Treasurer, Chas. Angus, Carrington; Directors: Chas. Pipley, Mount Pleasant; Albert Fahey, Mount Pleasant; Morton Eaton, R. S. Flinn, R. D. Walker, Beckwith; Auditors: Jerry Matinson, Philip Matinson............................

East Wallace Union.—President, D. G. McKenzie, North Shore; Secy-Treasurer, Stephen Seaman, Lower East Wallace; Directors: Jas. H. Miller, Geo. A. Miller, Lower East Wallace; John C. McKenzie, North Shore, Chas. Carlyle, East Wallace; W. C. Smith, Lower East Wallace; Auditors: W. C. Smith, Chas. Carlyle....................

Fox Harbor.—President, D. M. Bacon, Fox Harbor Point; Vice-President, Lewis Green, Fox Harbor Point; Secretary, W. L. McFarlane, Fox Harbor Point; Treasurer, Stanley Robertson, Fox Harbor Point; Directors; D. R. Stronberry, Fox Harbor; Murray Robertson, Freeman Hartling, Cape Cliff; Thos. McAulay, Fox Harbor; J. A. McFarlane, Fox Harbor Point; Auditors: M. Robertson, J. B. Robertson.................................

Lorneville.—President, W. H. Jackson, Lorneville; Vice-President, Manford Oxley, Tidnish; Secy-Treasurer, Jas. J. Brown, Lorneville; Directors: Earl Jackson, Walter Embree, Allison Baxter, Lorneville; Thos. Ogden, Tidnish; Chas. Ogden, Amherst Beach; Auditors: C. H. Jackson, S. L. Brannan.......................................

Malagash.—President, Walter Treen, Blue Sea Corner; Vice-President, J. B. Lombard, Blue Sea Corner; Secy-Treasurer, Arthur Treen, Blue Sea Corner; Directors: Geo. Myers, Malagash Centre; Wm. Treen, Lawrence Treen, Blue Sea Corner; Peter Murray, North Shore; John Purdy, Malagash; Auditors: Jas. Beattie, Peter Murray.........

Middleboro.—President, Asa Stevens, Middleboro; Vice-President, Edward Howard, Middleboro; Secy-Treasurer, G. G. McKim, Hartford; Directors: G. G. McKim, Hartford; C. A. Fountain, Upper Middleboro; Edward Howard, Upper Middleboro, A. W. Nelson, Hartford; David Howard, Middleboro; Auditors: Wm. Howard, Steve Robinson....

Minto.—President, David Bacon, Nappan Station; Vice-President, Henry Donkin, Fenwick; Secy-Treasurer, J. Wellington Lowther, Nappan Station; Directors: F. L. Roach, Herbert Blenkhorn, J. McC. Pipes, Jas. I. Stuart, Nappan Station; J. E. Harrison, Amherst Pt; Auditors: David Bacon, F. L. Roach...........................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts	Total Expenditure	Balance
31	98 00	59 70	372 95	107 77	265 18
20	40 00	40 00	223 68	253 41	29 73
18	42 00	40 67	94 18	90 18	4 00
28	56 00	45 43	228 88	210 60	27 28
29	46 25	42 12	187 49	183 26	4 23
18	70 00	50 19	154 03	153 21	82
22	40 00	40 00	139 13	57 00	82 13

Meadowville—President, Wilson S McConnell, Meadowville Station; Vice-President, A. R. McConnell, Meadowville Station; Secy-Treasurer., Jas. W. McBain, Meadowville Station; Directors: Jas. W. McBain, Geo. W. Murray, Meadowville Station; John W. McIntosh, Jas. Carter, John D. McConnell, meadowville Station R. R. 1; Auditors: J. W. McBain, G. W. Murray..................

Merigomish.—President, Renwick Forbes, Merigomish; Vice-President, Wm. Craigie, Merigomish; Secy-Treasurer, David Finlayson, Merigomish; Directors: Samuel Cameron, Wm. McGregor, Willard Copeland, Forrest Finlayson, George Roy, Merigomish; Auditor: J. W. Dunn..........

Mill Brook.—President, David Ferguson, Gairloch; Vice-President, John L. Munro, Mill Brook; Secretary, A. J. McIntosh, Mill Brook; Treasurer, John M. Gordon, Mill Brook; Directors: Hector McKenzie, Alex. D. McKenzie, Giarloch; John W. McDonald, Lovat; Wm. S. Fraser, Mill Brook; Wm. H. Fraser, Mill Brook.

Mount Thom.—President.—J. D. Sinclair, Salt Springs; Vice-President, W. D. McDonald, Salt Springs; Secy-Treasurer, D. R. Fraser, Salt Springs R. R. 1; Directors: N. E. Fraser, Chas. Fram, W. D. McLeod, W. C. Proudfoot, Wm. McKay, Salt Springs; Auditors: W. D. Maxwell, J. D. Sinclair.....................................

New Glasgow.—President, John W. McDougal, New Glasgow; Vice-President, E. A. Fraser, New Glasgow; Secy-Treasurer, Jas. R. Fraser, New Glasgow; Directors: John R. McMillan, New Glasgow; Alex. Logan, West New Glasgow, R. McG. Murray, West New Glasgow; H. F. McWilliam, William McLennan, Plymouth; Auditors: Don F. Fraser, Peter McFarlane........................

Pictou.—President, Wm. McKay, Bay View; Vice-President, Hugh Sutherland, Pictou; Secy-Treasurer, D. Logan, Pictou; Directors: Peter Watt, Pictou; Simon McKenzie, Waterside; W. D. Smith, Pictou; Wm. Grant, Three Brooks; Auditors: Jas. Stiles, C. J. Rood..........

Pictou Island.—President, Chas. McCollum, Pictou Island; Vice-President J. W. McDonald, , Pictou Island; Secy-Treasurer, L. Rankin, Pictou Island; Directors: Hec:-tor McDonald, Turkel McLean, Robt. McFarlane, Wm. McLean, Pictou Island.........................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
24	52 00	44 08	160 14	154 90	5 24
18	45 00	41 70	165 70	114 85	50 85
32	71 00	50 53	132 22	137 00	78
18	48 50	42 89	225 13	154 50	70 63
86	183 50	88 74	522 28	368 96	153 22
96	140 50	74 14	534 25	447 98	86 27
15	43 00	41 02	154 15	41 00	113 15

Pine Tree.—President, D. Robertson, Sutherland's River; Vice-President, D. Burns, West Merigomish; Secy-Treasurer, T. Beveridge, New Glasgow; Directors: E. T. King, Sutherland's River; Angus Grant, West Merigomish; J. Cameron, West Merigomish; W. Reid, Sutherland's River; W. Haines, Sutherland's River; Auditors: W. Reid, E. T. King..

River John, President, J. R. Collie, River John; Vice President, H. H. Sellars, River John R. R. 1; Secy-Treasurer Wm. McGregor, River John; Directors: H. M. Tattrie, River John; Leander Creelman, Seafoam; Jas. Sellars, River John; Bruce S. Langille, River John; W. J. McLean, Hedgeville..

Riverview.—President, D. L. Robertson, Avondale; Vice-President, Stewart Robertson, Barney's River Station; Secy-Treasurer, Frank H. McDonald, Avondale; Directors: H. F. McDonald, Russel Fisher, J. W. McPhee, R. H. Cunningham, Marshall Williams, Avondale; Auditors: Leonard Day, W. E. Townsend.......................

Rocklin.—President, Ernest Fraser, Rocklin; Secretary, Geo. W. McLeod, Burnside, Treasurer, John G. Sutherland, Burnside; Directors: Daniel Balfour, Rocklin; John T. Ken, Burnside; John G. Sutherland, Burnside; John J. Collins, Burnside; John J. McKenzie, Burnside..............

Rogers Hill.—President, Geo. D. Murray, Scotsburn Station; Vice-President, Geo. W. McKenzie, Scotsburn R. R. 2; Secy-Treasurer, W. S. McKean, Pictou R. R. 2; Directors: John A. McKean, Scotsburn R. R. 2; Wm. E. Murray, Scotsburn Station; John Stewart, Scotsburn Station; Geo. W. McKenzie, Wm. Cotter, Scotsburn R. R. 2; Auditors: Wm. E. Murray, J. T. R. Matheson..........

Salt Springs.—President, H. W. Gass, Salt Springs; Secy-Treasurer, R. A. Robertson, Salt Springs; Directors: Harry Brown, R. L. Bennie, T. B. Marchand, Geo. H. McLeod, Salt Springs..................................

Scotsburn.—President, H. J. McLeod, Heathbell; Vice-President, Robt. Douglas, Scotsburn, R. R. 2; Secy-Treasurer, Hugh Stewart, Scotsburn R. R. 2; Directors: R. T. Stewart, R. J. Smart, Alex. Douglass, Jas. Grant, D. W. Murray, Scotsburn; Auditors: Duncan Irving, E. K. Murray..

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
29	54 75	45 10	179 05	129 30	49 75
56	107 75	63 01	189 77	237 33	47 56
28	45 00	41 87	New	Society	
15	40 00	40 00	139 00	60 50	78 50
23	46 00	42 04	279 18	120 50	158 68
15	40 00	40 00	167 00	127 15	39 85
22	40 00	40 00	258 46	215 60	42 86

Seaview.—President, D. R. McGillvray, Dunmaglass; Vice-President, R. H. McGillvray, Dunmaglass; Secy-Treasurer, D. R. McKinnon, Ardness; Directors: Angus McEchern, Ardness; Angus B. McGillvray, R. A. McGillvray, Dunmaglass: Auditor: A. J. McGillvray...........

Strathshield.—President, D. D. McGillvray, Bailey's Brook; Vice-President, R. W. McGillvray, Bailey's Brook; Secy-Treasurer, D. L. McDonald, Bailey's Brook; Directors: D. W. McGillvray, Allan McGillvray, Hugh A. McDonald, Dan McLean, Hugh C. McDonald, Bailey's Brook; Auditors D. W. McLean, John N. McKinnon....................

Toney River.—President, Geo. R. McConnell, Tony River; Vice-President, Jas. Elliott, Toney River; Secy-Treasurer, Daniel A. McKenzie, Toney River; Directors: John D. Munro, Toney Mills; Albert H. Johnson, Toney River; John D. Henderson, John D. McMillan, Toney Mills; Auditors: Geo. R. McConnell, John D. Henderson..

Union Centre.—President, Duncan Fraser, Westville, R. R. 2; Vice-President, Wm. Harris, Union Centre; Secretary, Alex. Ross, Westville R. R. 2; Treasurer, Warren McKenzie, Union Centre; Director John McNeil, John G. Munro, Geo. Ross, Union Centre; John Crawford, Middle River; Thos. Hamilton, Union Centre; Auditors: John Munro, Wm. Gray.............................

West Branch.—President, J. W. Ross, West Branch; Vice-President, Thos. Harbourn, West Branch; Secy-Treasurer, Murdock Sutherland, West Branch; Directors; Hugh McLean, Jas. Graham, Warren Rae, Geo. Urquhart, Hugh R. Ross, West Branch; Auditors: H. D. McKenzie, Thos. Harbourne..............................

West River.—President, Aubrey H. Clark, Pictou R. R. 2; Vice-President, John F. Proudfoot, Pictou R. R. 2; Sec-Treasurer, Wm. O. Creighton, West River, R. R. 1; Directors; Geo. J. Stewart, Pictou R. R. 2; Scott Grant, West River, R. R. 1; Geo. Browregg, Pictou R. R. 2; Stewart McLennan, Pictou R. R. 2; Wm. McLean, West River Station R. R. 1..............................

West River Station.—President, Wm. Graham, West River Station; Vice-President, Rod McDonald, West River Station R. R. 1; Secy-Treasurer, Kenneth Ross, West River Station; Directors: Geo. Baillie, West River Station; Simon Fraser, West River R. R. 1; Geo. McBeth, West River Station; John R. McDonald, Watervale; Angus McDonald, West River Station; Auditors: John McN. Campbell, Wm. Baillie..............................

Number of Members-	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
17	42 00	40 67	107 81	130 04	22 23
31	46 50	42 21	90 09	85 75	4 34
19	46 00	42 04	227 69	115 13	111 56
20	43 75	41 27	137 04	129 00	8. 04
45	140 50	74 14	247 73	277 18	54 45
16	40 50	40 17	257 50	153 40	104 10
17	42 00	40 67	100 61	90 61	10 00

Westville.—President, Jas. McCoul, Westville; Vice-President, Wm. Fraser; Secretary, J. K. McKenzie, Westville, Box 359; Treasurer, Alfred P. McLeod, Westville; Directors: Joseph Fairoir, G. Oliver, Hanry Marshall, Daniel Robertson, Wm. Fraser, Westville; Auditors: J. T. A. Quarrie, John D. Fraser..........................

QUEENS COUNTY.

Mutual Benefit.—President, N. W. Frank, North Brookfield; Vice-President, S. Fancey, North Brookfield; Secy-Treasurer, F. C. Hunt, North Brookfield; Directors: S. Fancey, W. L. Dailey, A. W. Hendry, R. F. Wear, Willis Harlow, North Brookfield; Auditors: A. W. Hendry, R. F. Wear..................................

North Queens.—President, G. W. Rafuse, Caledonia; Vice-President, Z. F. Minard, Caledonia: Secy-Treasurer, F. P. Cushing, Caledonia; Directors: Wilson Bates, Geo. Douglas, Arthur Smith, Edmund Telfer, Elton Smith, Caldonia

Pleasant River.—President, Lloyd Colp, Pleasant River; Vice-President, S. S. Waterman, Pleasant River; Secy-Treasurer, Freeman Waterman, Pleasant River; Directors: M. F. Colp, A. M. Frank, Geo. Herman, John Smith, Henry Wile, Pleasant River; Auditors: Zacariah Smith, John Smith.................................

South Brookfield.—President, J. W. Smith, South Brookfield; Vice-President, L. A. DeNovd, South Brookfield Secy-Treasurer, S. P. Smith, South Brookfield; Directors: Chas. Cameron, South Brookfield; W. Freeman, L. A. Crooker, Chas. Spears, Robt. Smith, South Brookfield....

RICHMOND COUNTY.

Arichat.—President, Rev. Geo. A. Andrews, Arichat; Vice-President, John Tyrell, Arichat; Secy-Treasurer, Jas. D. Power, Arichat; Directors: Chas. Malzard, D. H. Campbell, M. B. McNeil, Reynolds Smith, E. C. Doyle, Arichat..

Arichat East.—President, Dr. A. B. LeBlanc, Arichat; Vice-President, G. Gallant, Little Banashoes; Secy-Treasurer, Chas. Marchand, Arichat; Directors: A. D. Sampson, Alex. Edward, Arichat; Alfred Sampson, Arichat; Neddie DeWolfe, Little Banshoes; Francis Edward, Pondville.....

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
48	61 00	47 13	221 30	153 00	68 30
19	63 00	47 81	187 80	228 80	41 00
21	40 00	40 00	87 71	89 89	2 18
25	40 00	40 00	101 34	102 44	1 10
52	62 00	47 47	113 53	109 25	4 28
49	54 00	44 76	238 23	203 04	35 19
48	49 00	43 06	145 33	160 93	15 60

Barra Head.—President, Rev. R. L. McDonald, St. Peters; Vice-President, Jas. E. Harris, Barra Head; Secy-Treasurer, Ernest McNeil, Barra Head; Directors: Jas. Cameron, Henry Langley, John D. McNeil, Dan B. McMcLean, Alex. McDonald, Barra Head; Auditors: Wm. A. McDonald, John Arsebault........................

Descousse.—President, Rev. Wilfred A. Bouchie, Descouse; Vice-President, L. L. Pertus, Poulamond; Secy-Treasurer, Edward Doyle, Poulamond; Directors: L. N. Porrier, Elias McDonald, Felix Landry, Lenox Levscount, Descousse, Mathew Britton, Porrierville; Auditors: Peter Dunn, Alfred Pertus..............................

Grand Anse.—President, D. D. Buchanan, Grand Anse; Vice-President, M. J. McDonald, Grand Anse; Secy-Treasurer, D. A. McRae, Grand Anse; Directors: Murdock McPherson, Dan Ferguson, D. H. McDougald, G. J. Hill, Malcolm McPhail, Grand Anse; Auditors: John A. McRae, G. J. McDonald..............................

Grand River.—President, Dan J. Matheson, Grand River; Vice-President, A. R. Urquhart, Grand River; Secy-Treasurer, Alex. G. McKay, Grand River; Directors: Alex. D. McKay, R. C. Matheson, John F. McCuspic, Archy C. McBeth, Grand River; Wm. Kempt, Larcheveque; Auditors: Alex. J. McKay, John L. McAulay...............

Irish.—President, Jas. Johnson, Red Islands; Vice-President, Joseph Cash, Irish Cove; Secy-Treasurer, John J. Johnston, Red Islands; Directors: Jas. D. Campbell, John S. McKenzie, Red Islands; Jerry McMillan, Michael Campbell, Irish Cove; Martin Campbell, Johnston's Harbor; Auditors: M. J. McDonald, Murdock McKay...........

Kempt Road and Cleveland.—President, Duncan McMillan, Kempt Road; Vice-President, Jas. N. McLellan, Kempt Road; Secy-Treasurer, John A. McLeod, Kempt Road; Directors: D. A. McIntyre, R. N. McLean, Hugh A. McLeod, Hugh Campbell, Kempt Road; Jas. H. McKillam, Cleveland; Auditors: J. W. McKay, Alexander McMillan..

Louisdale.—President, Alfred Sampson, Louisdale; Vice-President, J. Scott Nelson, Louisdale; Secy-Treasurer, Rennie Sampson, Louisdale; Directors: Hector Landry, Henry White, Felix J. Sampson, Lawrence Sampson, John Kavanagh, Louisdale; Auditors: Thomas T. Sampson, Daniel J. Marchand.............................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
22	44 00	41 36	115 14	112 59	2 55
87	95 50	58 86	248 21	138 75	109 46
20	41 00	40 34	151 88	43 75	108 13
20	40 00	40 00	199 70	120 85	78 85
25	50 00	49 39	Resusitated.		
27	69 87	50 16	New	Society	
41	41 00	40 34	93 10	84 66	8 44

Petit De Grat.—President, Capt Sylvester Boudreau, Petit De Grat; Vice President, Elias V. Landry, Petit De Grat; Secy-Treasurer, John A. Landry, Petit De Grat; Directors: Daniel C. Sampson, Hiliare Blois, Edward Landry, Chas. P. Boudreau, Petit de Grat; Sylvester Sampson, Lower Anse; Auditors: Robt, Martell, Hugh Clemen......

Port Royal.—President, Chas. P. Forgerson, Port Royal; Vice-President, Peter Theriault, Port Royal; Secy-Treasurer Alban Poirir, Port Royal; Directors: Hugh McEchron, Daniel McDonald, R. Forrest, Chas. F. Forgerson, Jeffry LeBlanc, Port Royal..............................

Progressive Farmers.—President, C. G. Manger, Cap LaRonde; Vice-President, Patrick Kehoe, Rocky Bay; Secy-Treasurer, Vincent Doyle, Descousse; Directors: Wm. J. Hern, Rocky Bay; John T. Bona, Cap LaRonde; Chas. D. Doyle, Rocky Bay; Wm. Latimer, Cap LaRonde; Jas. Manger, Cap LaRonde; Auditors: Thos. Manger, Thos. Kehoe......................................

Soldier's Cove.—President, R. L. McDonald, Soldier's Cove; Vice-President, John J. McDonald, Soldier's Cove; Secy-Treasurer, Stephen T. Thomas, Soldier's Cove; Directors: Allan H. McDonald, Alex. A. McDonald, William McDonald, John F. Gillis, Wm. Sutherland, Soldier's Cove; Auditors: Martin Gillis, Peter McKenzie...............

West Arichat.—President, Benjamin Sampson, West Arichat; Vice-President, Colin R. Gerrior, West Arichat; Secy-Treasurer, W. H. LeBlanc; West Arichat; Directors: Rev. J. E. Robitaille, P. P., West Arichat; Hugh McEchern, Peter Terris, Port Royal; Chas. Forrest, Jas. McDonald, West Arichat...............................

West Bay.—President, Peter Dumphy, St. George's Channel; Vice-President, Murdock McInnis, St. George's Channel; Secretary, F. C. Cotton, St. George's Channel; Treasurer, Peter Dunphy, St. George's Channel; Directors: Alex. J. Campbell, Benj. McKenzie, W. H. Ross, John D. McRae, Dan Cameron, St. George's Channel...........

SHELBURNE COUNTY.

Barrington.—President, D. Sargent, Barrington Passage; Vice-President, T. W. Robertson, Barrington Passage; Secy-Treasurer, F. W. Sargent, Crowell; Directors: J. R. Gammon, Geo. W. Smith, J. H. Christie, Barrington Passage, Andrew Hopkins, W. L. Smith, Crowell; Auditors: D. Sargent, Geo. W. Smith..........................

Number of Members	Amount Subscribed	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
15	40 00	40 00	117 28	121 93	4 65
45	45 00	41 70	New	Society	
42	102 50	61 23	New	Society	
18	54 00	44 75	155 42	120 83	34 49
61	61 00	47 14	83 42	143 45	60 03
23	46 00	42 03	175 44	143 07	323 37
48	62 75	47 50	150 27	107 00	43 27

Granite.—President, A. M. Wilson, Barrington; Vice-President, L. Davis, Barrington; Secretary, Stanley Doane, Barrington; Treasurer, J. Homer, Barrington; Directors: J. McMullin, J. McKenna, L. Davis, J. Homer, Barrington; Auditors: J. Homer, F. Watt........................

Shelburne.—President, H. A. Harris, Welshtown; Vice-President, Lorenzo Jones, Upper Ohio; Secy-Treasurer, W. K. Hood; Shelburne; Directors: L. Q. Gulton, W. I. Farquhar, A. M. Swabsburg, F. W. Bower, Henry W. Bower Shelburne; Auditors: R. A. Bruce, F. C. Blanchard........

VICTORIA COUNTY.

Baddeck Bridge.—President, Duncan McRae, Baddeck Bridge; Vice-President, E. F. McRae, Baddeck Bridge; Secy-Treasurer, Angus McKay, Baddeck Bridge; Directors: Allan McKay, Duncan McRae, Andrew McCharles, A. J. McRae, F. A. McRae, Baddeck Bridge..................

Baddeck Valley.—President, Jas. T. Keiley, Baddeck Bridge; Vice-President, Chas. McPhee, Baddeck Forks; Secy-Treasurer, M. R. McLeod, Baddeck Bridge; Directors: Alex. McAulay's P. O., Big Baddeck; Duncan Buchanan, Baddeck Forks; E. P. Reil, Baddeck Forks; Albert Crowdis, C. J. Nicholson, Baddeck Bridge; Auditors: C. J. Nicholson, Baddeck Bridge; Auditors: C. J. Nicholson, Duncan Gillis..

Cape North.—President, Arch. McDonald, Cape North; Vice-President, Duncan McDonald, Cape North; Secy-Treasurer, N. M. McDonald, Cape North; Directors: Angus M. McKinnon, Arthur MacAvoy, J. D. Morrison, V. E. Harris, A. J. Zwicker, Cape North; Auditors: Kenneth McKinnon, J. H. Campbell.........................

Hunter's Mountain.—President, A. J. Cain, Hunter's Mountain; Vice-President, Frank McGregor, Cain's Box; Secy-Treasurer, A. F. McRae, Nyanza; Directors: H. G. Matheson, H. A. Morrison, H. C. McIver, Alex. Campbell, Hunter's Mountain; John A. McDonald, Cain's Box; Auditors: H. G. Matheson, Philip Campbell................

Iona.—President, Rev. Roderick McKenzie, P. P., Iona; Vice-President, Dan A. McDonald, St. Columba; Secy-Treasurer, John R. Campbell, Jamesville West; Directors; Jas. A. McNeil, Gilles's Point; Rory MeNeil, Iona; John T. McKinnon, McKinnon's Harbor; Paul McKinnon, arra Glen; Neil P. McLean, Washabuck Centre; Auditors: dward McNeil, George McNeil..........................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
54	59 25	46 29	213 92	207 04	6 88
100	100 00	59 86	1011 36	825 29	186 07
15	42 00	40 67			
22	45 00	41 70	101 40	118 04	16 64
34	58 00	46 12	116 37	100 65	15 72
15	60 00	46 80	New	Society	
55	76 50	52 41	251 73	251 50	23

Lakeview.—President, Jas. C. McDougall, Baddeck; Vice-President, Geo. R. Andreson, Baddeck; Secy-Treasurer John E. Campbell, Baddeck; Directors: E. G. McAskill, A. Y. McDonald, Alex. McPherson, Henry M. Crowdis, A. S. McDonald, Baddeck; Auditors: G. F. McRae, A. S. McDonald..

Middle River.—President, Forbes McDonald, Upper Middle River; Vice-President, Geo. E. Ingraham, Upper Middle River; Secy-Treasurer, D. McLennan, Upper Middle River; Directors: Kenneth Finlayson, R. J. McRae, Rory McLeod, I. A. McDonald, Upper Middle River; Dan McDermid, Middle River; Auditors: Rory J. McLeod, Dan McDermid.

YARMOUTH COUNTY.

Brookside.—President, John Smith, East Pubnico; Vice-President, Eben Nickerson, East Pubnico; Secy-Treasurer, Chas. S. Wyman, East Pubnico; Directors: Thos. Adams, Loran Smith, East Pubnico; Arthur D'Entremont, Middle West Pubnico; Lawrence Amiro, Geo. Fox, East Pubnico; Auditors: Capt. Jas. Larkin, Geo. Fox, Loran Smith......

Kemptville.—President, John Burrill, North Kemptville; Vice-President; Arthur L. Roberts; Kemptville; Secy-Treasurer, A. M. Gates, Kemptville; Directors: L. K. Morton, C. C. Roberts, David Randall, Kemptville; Lloyd E. King, Silvanus Crowell, Kemptville, R. R. 1; Auditors: Wm. Goodwin, Jas. H. Sabean........................

Yarmouth Central.—President, R. C. Wyman, Ohio R. R. 2; Vice-President, Alvin Crosby, Ohio R. R. 2; Secy-Treasurer, Geo. C. Killam, Pleasant Valley; Directors: S. F. Killam, Pleasant Valley; A. A. Crosby, T. W. Roberts, O. P. Ryerson, Ohio R. R. 2; Auditors: A. A. Crosby, E. E. Porter..

Yarmouth County.—President, E. K. Spinney, Yarmouth; Vice-President, S. A. Cook, Yarmouth; Secy-Treasurer, Wm. Corning, Yarmouth; Directors: J. J. Lovitt, J. M. Porter, J. F. Palmer, John C. Corning, Walter Churchill, Yarmouth; Auditors: W. A. Godfrey, W. M. Kelly....

Yarmouth Township.—President, Moses Harris, Hebron; Vice-President, J. A. McCormack, Wellington; Sectetary, W. A. Churchill, Lakeside; Treasurer, Asa Porter, Hebron; Directors: Chas. Porter, Thos. Moses, Chas. Rogers, Edward McCormack, Glynn Moses, Hebron......

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
21	42 00	40 67	215 07	78 00	137 07
16	40 00	40 00	146 42	13 06	133 36
56	82 25	54 36	273 16	171 05	102 11
84	186 00	89 60	521 89	514 99	6 90
18	46 50	42 22	157 45	106 22	51 23
414	637 00	242 80	4746 66	4639 66	107 00
40	60 00	46 80	664 74	358 25	306 51

REPORT OF THE STANDING FIELD CROPS COMPETITION FOR 1916.

Last year we were inclined to think that interest in field crops had reached its limit. This year, however, partly due to the campaign of Patriotism and Production, and partly due to the demand for better seed, and notwithstanding there were turnip competitions in four counties instead of six, the entries exceeded those of any previous year.

As all crops were, in the Maritime Provinces, either an average or above an average yield and many crops were more or less of a failure in other parts of Canada, the demand for seed is greater than ever before which will probably have a stimulating effect on these competitions for the coming season.

The total amount of prize money paid was $2023.28 divided as follows:

Wheat	$328.60
Oats	651.60
Potataes	193.08
Turnips	850.00

The number of entries were: wheat 103, Oats 205, Potatoes 62 and Turnips 38, making a total of 408, an increase of 23 over the previous year.

Owing to the high price of flour and the establishing of up-to-date mills, and last but not least, the Field Crops Competition, wheat has taken a place among the farm crops hitherto unheard of. Although not essentially a wheat growing province yet the yield per acre compares favorably with any other part of Canada. With the advent of Field Crops Competitions and Seed Fairs several farmers undertook the development of strains of wheat that had been grown by the same family for generations, and as a result strains have been established which have no equal in our province for cropping and milling purposes. This is also true regarding oats and therefore today instead of importing seed, the demand is for *home grown* seed. I think I am safe in saying that this year 75% of the seed used will be home grown product, most of which will be supplied by farmers who at the outset took an interest in "Hand Selection," "Field Crops Competitions" and "Seed Fairs."

In the potato competition the province was divided into districts as follows:

District No. 1, Digby, Yarmouth, Shelburne and Queens.
" " 2, Annapolis, Kings, Lunenburg and Hants.
" " 3, Colchester, Cumberland and Pictou.
" " 4, Halifax, Guysboro and Antigonish.
" " 5, Victoria, Cape Breton, Inverness and Richmond.

There were sufficient entries to make a competition in each district. In District No. 2 the entries were all from Lunenburg County and again the largest average yields came from that county. In the western part of the province unsprayed fields were badly affected by blight while in the eastern portion most of the fields escaped whether sprayed or not.

While the average yield of all fields entered in Lunenburg County was about 400 bushels per acre there were individual fields in other sections of the province equal to the best. The high average yield in Lunenburg County is largely due to the fact that there is no other part of the province where spraying is so systematically and thoroughly done.

The Turnip Growing Competition, which has now covered a period of five years, originated in the year 1912 with Mr. A. N. Faulkner, a former Nova Scotian now residing in New York, who desirous of stimulating agriculture in his native province, conceived the idea of offering prizes to boys between the ages of fifteen and twenty years for the best acre of turnips grown on their father's or guardian's farm. The prizes offered were: 1st. $75.00., 2nd. $50.00, 3rd. $30.00 and 4th $20.00. This was offered in two counties, Cumberland and Colchester. This was duplicated the following year (1913) by the same gentleman. In 1914 the Department of Agriculture, realizing the importance of this competition offered to provide one-half the amount necessary to carry on this work in any county providing the rest was raised by private subscription. In that year Mr. Faulkner provided one-half the necessary funds for a competition in Colchester and Cumberland Counties and the Federal and Provincial representatives for Pictou County furnished the necessary funds for a competition in that county. In 1915 there were six counties having competitions. In Inverness and Guysboro the necessary funds were provided by Mr. Faulkner, In Antigonish D. G. Kirk contributed the required amount. Members of the Halifax Board of Trade looked after

Halifax County while Colchester was indebted to a number of gentlemen headed by Mr. James Fulton, Bass River. Last Year, 1916, there were four counties in the competition. Inverness and Guysboro were again indebted to Mr. Faulkner, Antigonish to D. G.Kirk and a number of friends, and Colchester to practically the same men who previously supplied the funds. In addition to the regular prizes paid, the Department of Agriculture paid consolation prizes to the boys making good scores but failing to win any of the regular prizes. Thus during the five years about $2000.00 was paid out in prize money, $1225.00 of which was donated by Mr. Faulkner.

A word as to the results: taking five years and covering six counties, the average yield of the prize winning fields was 1007.1 bushels per acre, and taking the total number of entries we have 840.1 bushels per acre as the average yield.

When you consider that these plots were operated by boys and confined to farms that were assessed for not more than $3000.00 one cannot fail to be impressed with the results obtained.

Viewing the competitions from another angle, the benefit to the prize winner. One is at a loss in estimating the benefits which have, and may accrue to the successful competitors. Suffice it is to say that several of these boys have laid the foundations for pure bred herds which will be heard from in the future. Others have spent one or more terms at the Agricultural College, and still others have underdrained portions of their farms, fitted up-to-date stables, cleared additional land, and made numerous other improvements. Those who have contributed to this cause can rest assured that their sacrifices have not been in vain as many a boy has received an inspiration which will grow as time goes on, which will not only make him a better farmer but a better citizen. In fact having won a prize which was made possible through another's generosity and public spiritedness will have a tendency to make him want to assist his fellow men, which is the highest type of citizenship.

A word about the future of this competition. Realizing the numerous and large demands on personal resources during the present "crisis" we who have had the carrying on of this competition feel that it would be unfair to ask or unreasonable to expect, the same gentleman to continue this work.

However, feeling that something should be done to keep up a competition which is so closely related to the agricultural prosperity of our province, we have arranged to have it province wide in scope and included as one of the crops in our Field Crops Competitions. For this crop the province is divided in districts the same as for the Potato Competition and prizes awarded in proportion to the scores made.

Field crops circulars giving complete details of this competition will be distributed at an early date.

The following pages contain a detailed account of the various competitions for the season of 1916.

Respectfully submitted,

F. L. FULLER.

WHEAT.

ANNAPOLIS COUNTY.

Name	Address	Variety.
A. P. Ramsay	Clarence	Red Fife
Stewart Leonard	Clarence	Red Fife
T. E. Smith	Clarence	Marquis
V. B. Leonard	Clarence	Red Fife
Chas. G. Foster	Clarence	White Fife
Eldon Marshall	Clarence	Marquis

ANTIGONISH COUNTY.

Name	Address	Variety.
Dan Duggan	Beech Hill	White Russian
Ronald Chisholm	Glen Road	White Russian
Thos. Hogan	Harbor Road	White Russian
Crockett Bros.	Antigonish	Scotch Fife
Jas. Dunn	Lr. South River	White Russian
Alex. C. Chisholm	North Grant	White Russian
Dougald Cameron	Loch Katrine	White Russian
D. R. Henderson	Copper Lake	White Russian
Cameron Chisholm	Salt Springs	White Russian
Jas. Carter	Antigonish	White Russian
Angus A. McDonald	Up. South River	White Russian
Dan Chisholm	Malignant Cove	White Fife

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of m tutity	Total.
5	10	5	25	10	20	20	5	100
4.75	9.5	4.75	22.	9.5	19.	18.	4.75	92.25
4.25	8.5	4.75	24.	9.	19.	17.	5.	91.5
4.75	9.	4.75	23.	9.5	18.	17.	5.	91.
4.	9.	4.5	23.5	8.	19.	17.	4.5	89.5
4.	9.	4.75	23.	9.5	17.	17.	4.75	89.
3.	6.	4.	15.	8.	15.	15.	3.	69.
4.75	9.	5.	23.	10.	20.	16.	5.	92.75
4.75	9.	5.	22.	10.	20.	16.	5.	91.75
4.25	8.	5.	23.	10.	20.	16.	5.	91.25
5.	9.	4.75	24.	9.25	18.	16.	5.	91.
4.	8.	5.	22.	10.	20.	16.	5.	90.
4.5	8.	5.	22.	9.	20.	16.	5.	89.5
4.75	7.	5.	22.5	10.	20.	15.	4.75	89.
4.75	7.5	5.	22.	9.5	18.	17.	5.	88.75
5.	9.	4.5	23.	10.	16.	16.	4.75	8 .25
4.5	7.	4.5	22.	10.	18.	17.	5.	88.
4.5	8.	5.	23.	9.5	18.	15.	5.	88.
4.5	9.	5.	23	10.	13.	17.	5.	86.5

Name of Competitor	Address	Variety
John Chisholm	Clydesdale	White Russian
Herbert Bell	Beech Hill	White Russian
P. J. Hanrahan	Fairmont	White Russian
Dan Cameron	Fairmont	White Russian
John J. Chisholm	Malignant Cove	White Russian
Hugh McNeil	Harbor Centre	White Russian
CAPE BRETON COUNTY.		
J. C. Cash	Irish Cove	Red Fife
John McMullin	George's River	Red Fife
E. J. Johnston	George's River	Red Fife
Rod McLeod	Groves Point	White Russian
Alex. Gillis	George's River	White Russian
J. W. McIsaac	East Bay	White Russian
Chas. Guthre	French Vale	White Russian
COLCHESTER COUNTY.		
J. R. Semple	Tatamagouche	Red Fife
J. L. Cunningham	Bay Head	White Russian
R. D. McKay	Balmoral Mills	Red Fife
A. B. Cunningham	Tatamagouche	Red Fife
Alex. Ross	East Earltown	White Russian

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total.
5.	7.	4.75	22.	9.5	17.	16.	5.	86.25
5.	9.	4.5	22.	7.5	15.	17.	5.	85.
3.5	8.	5.	23.	10.	15.	15.	5.	84.5
4.	7.	4.5	22.	10.	16.	16.	5.	84.5
4.5	8.	4.75	22.	7.	18.	15.	5.	84.25
4.	8.	5.	20.	10.	16.	15.	5.	83.
4.5	10.	4.	21.	9.5	18.	16.	5.	88.
4.5	9.	4.75	20.	8.	18.	17.	5.	86.25
4.5	8.5	4.75	21.	7.5	18.	16.	5.	85.25
3.5	8.	4.5	20.	8.	17.5	16.	4.	81.5
3.5	7.5	4.	20.	7.5	19.	15.	4.75	81.25
3.	8.	4.	22.	8.	12.	16.	4.5	77.5
3.	7.	3.5	22.	9.	12.	15.	5.	76.5
5.	9.75	4.75	23.	9.75	20.	18.	4.75	95.
4.75	9.25	4.75	23.5	9.75	19.75	18.	4.75	94.5
4.75	9.75	4.5	23.5	9.5	19.75	17.5	4.75	94.
4.	9.5	4.5	23.5	8.5	17.5	17.	5.	89.5
4.5	9.5	4.5	21.	9.5	16.5	16.5	4.5	86.5

Name of Competitor	Address	Variety
Jas. R. Hogan	Denmark	White Russian
Jas. S. Reid	Tatamagouche	White Russian
Blair Cutten	Lower Truro	Red Fife
John W. Murray	Balmoral Mills	Red Fife
CUMBERLAND COUNTY.		
W. L. McFarlane	Fox Harbor Pt	Red Fife
L. G. Stevens	Wallace Grant	White Russian
D. J. McIntosh	Stake Road	Marquis
J. R. Harrison	Maccan	White Russian
M. B. Harrison	Athol	Red Fife
GUYSBORO COUNTY.		
Frank Forbes	Goshen	White Russian
J. A. Sinclair	Goshen	White Russian
J. W. McIntosh	Goshen	White Russian
D. McNeil	So. River Lake	White Russian
Vincent McLean	New Town	White Russian
Alex. D. Archibald	Glenelg	Red Fife
Thos. Kennedy	So River Lake	White Russian
A G. Archibald	Glenelg	White Russian

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total.
4.5	9.25	4.75	19.	9.	17.	16.5	5.	85.
4.5	9.5	4.75	18.	8.	19.	16.	4.75	84.5
4.5	9.5	4.25	17.5	9.75	16.5	16.	5.	83.
3.	9.	4.5	17.	9.	19.	16.	5.	82.5
4.75	9.5	5.	23.5	8.75	20.	18.	5.	94.5
4.5	9.	4.75	22.	9.5	16.	17.	4.75	87.5
5.	9.75	4.75	20.5	9.5	16.	16.5	4.75	86.75
3.5	8.25	4.5	16.5	9.75	15.	16.	4.5	78.
3.5	8.	4.	16.	9.5	15.	16.	5.	77.
4.5	9.	3.5	23.5	9.	19.5	19.	4.	92.
4.75	8.5	4.	24.	8.	19.	18.5	4.5	91.25
4.	8.5	4.5	22.75	9.5	17.5	18.	4.5	89.25
4.	8.	5.	22.	9.5	18.	17.5	4.5	88.5
4.	8.5	5.	22.75	9.5	17.5	16.	4.5	87.75
4.	9.	4.	20.	9.5	18.	18.	4.	86.5
3.5	7.5	4.5	24.	9.	16.5	16.	4.5	85.5
3.	7.5	3.5	23.	9.	18.	17.	4.	85.

HALIFAX COUNTY.

Name of Competitor	Address	Variety.
Wm. Logan	M Musquodoboit	Red Fife
John Ogilvie	M Musquodoboit	Red Fife
P. G. Archibald	C Musquodoboit	White Russian
Aubrey Archibald	C Musquodoboit	White Russian
Robt. Kaulback	M Musquodoboit	Red Fife
Roy B. McCurdy	M Musquodoboit	Red Fife
A. D. Burris	U Musquodoboit	Red Fife
E. McL. Benvie	C Musquodoboit	White Russian
A. Archibald & Son	M Musquodoboit	Red Fife

INVERNESS COUNTY.

Name of Competitor	Address	Variety.
John A. Burton	N. E. Margaree	White Russian
Alex. D. Beaton	Little Judique	White Russian
Angus R. Campbell	Beatonville	White Russian
Eddie Smith	Black Stone	
Alex. D. Cameron	Mabou	
D. D. McDonald	Glendale	White Russian
D. F. Beaton	Glenora Falls	White Fife
Roddie McDonald	Port Hood	White Russian

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total.
5.	10.	5.	24.	7.	19.5	18.5	5.	94.
4.5	9.	4.	23.5	9.	19.5	18.5	4.5	92.5
4.5	8.5	4.	24.	9.5	19.5	17.	4.	91.
4.5	9.	5.	23.	9.	19.	17.	4.	90.5
4.	8.	4.	24.	9.	19.	17.	4.	89.
4.	8.	4.5	23.	7.	19.	17.	4.5	87.
3.5	7.5	5.	23.	10.	16.	16.5	4.5	86.
3.5	7.5	5.	22.	9.	17.5	17.	4.	85.5
4.	9.5	4.	20.	9.	17.	17.	4.5	85.
4.5	9.	5.	23.	9.	18.	16.	4.5	89.
4.5	9.	4.	22.	8.	15.	17.	5.	84.5
4.	8.	4.	23.	8.	15.	16.	4.75	82.75
4.	9.	3.5	21.	8.	15.	16.	4.5	81.
3.	7.	5.	20.	10.	16.	14.	5.	80.
3.	6.	5.	22.	8.	16.	15.	5.	80.
3.5	7.	4.	22.	9.	15.	13.	4.5	78.
2.	6.	3.	20.	9.	17.	15.	4.5	76.5

Name of Competitor	Address	Variety.
Angus R. McDonald	Broad C. Chapel	Red Fife
H. A. McPherson	Mabou	
Constant AuCoin	Belle Cote	
Donald A. Gillis	Little Judique	White Russian
Angus F. Cameron	Mabou	
Alex. Rankin	Judique	White Russian

PICTOU COUNTY.

Name of Competitor	Address	Variety.
Jas. W. Maxwell	Durham	White Russian
A. D. McKay	Pictou	White Russian
Calvin Langille	Marshville	Red Fife
R. D. Ross	Bayview	White Russian
Clarence Langille	Marshville	White Russian
Cyrus Langille	Marshville	Red Fife
H. M. Tatarie	River John	Red Fife

RICHMOND COUNTY.

Name of Competitor	Address	Variety.
John J. McDonald	Soldier's Cove	Red Fife
Jas. H. McIntosh	Dundee	White Russian
Benjamin McKenzie	St. Geo. Channel	White Russian
Murdock McInnes	St. Geo. Channel	White Russian
Hugh Murray	St. Geo. Channel	White Russian

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total.
3.	7.	5.	20.	10.	14.	14.	4.5	75.5
4.	9.	5.	24.	7.	5.	15.	5.	74.
3.	6.	5.	20.	10.	10.	14.	4.	72.
4.	7.	5.	23.	2.	15.	10.	5.	71.
4.	8.	4.	20.	10.	5.	14.	4.	69.
3.	6.	3.	20.	6.	15.	10.	4.	67.
4.75	10.	5.	23.5	9.	18.	19.	5.	94.25
4.5	9.75	4.	24.	8.75	19.	18.5	4.	92.5
3.5	8.	5.	24.5	9.	19.	17.5	4.5	91.
4.	8.25	4.	23.5	9.	18.25	19.	3.75	89.75
4.	9.	4.5	23.	8.5	17.	18.	4.5	88.5
4.75	7.5	5.	23.	7.5	19.	17.	3.5	87.25
3.	7.5	5.	23.	8.	18.	17.	3.5	85.
3.	8.	5.	22.	9.	17.	16.	5.	85.
3.5	8.	5.	22.	9.	16.	16.	5.	84.5
4.	8.	5.	22.	8.	16.	16.	5.	84.
4.5	8.	5.	22.	6.	17.	16.	5.	83.5
3.	7.	5.	22.	9.5	17.	15.	5.	83.5

Name of Competitor	Address	Variety.
Reynolds Smith	Arichat	Red Fife
A. H. McKay	St. Geo. Channel.	White Russian
John J. Johnson	Red Islands	White Russian
M. E. McNeil	Irish Cove	Red Fife
Jas. B. Calder	St. Geo. Channel.	White Russian

VICTORIA COUNTY.

Name of Competitor	Address	Variety.
F. A. McRae	Baddeck Bridge	Red Fife
Abner Crowdis	Baddeck Bridge	Marquis
Everett Rice	Baddeck Bridge	Red Fife
Farquhar Buchanan	Baddeck Forks	Red Fife
Farland McFarland	Baddeck	Red Fife

YARMOUTH COUNTY.

Name of Competitor	Address	Variety.
Walter Churchill	Brooklyn	White Russian
John C. Corning	Chegoggin	White Russian
John Purdy	Chegoggin	White Russian
H. W. Corning	Chegoggin	White Russian
Wm. Killam	Dayton	White Russian

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total.
4.5	8.	5.	21.	5.	19.5	16.	4.5	83.5
2.	6.	5.	22.	8.	19.	16.	5.	83.
4.	9.5	4.75	22.	7.	14.	17.	4.5	82.75
4.	7.	5.	22.	8.	14.	17.	5.	82.
3.	6.	4.	21.	9.	18.	15.	4.5	80.5
4.25	8.	4.75	24.	10.	16.5	16.	4.5	88.
4.5	9.5	5.	20.	10.	16.	18.	4.5	87.5
4.5	8.5	4.75	22.	10.	16.	15.	4.5	85.25
4.25	7.5	4.75	22.	9.5	16.	15.	4.75	83.75
4.25	7.	4.75	25.	9.	16.	12.	4.25	82.25
5.	7.	5.	22.	10.	16.	16.	5.	86.
5.	9.	5.	24.	10.	9.	18.	5.	85.5
5.	7.	4.5	24.	9.5	10.	17.	4.5	81.5
4.5	9.	5.	23.	10.	7.	17.5	5.	81.
5.	8.	4.5	25.	10.	8.	15.	5.	80.5

OATS.

ANNAPOLIS COUNTY.

Name of Competitor	Address	Variety.
Henry D. Starratt	Clarence	Banner
A. P. Ramsey	Clarence	Banner
V. B. Leonard	Clarence	Banner
Stewart Leonard	Clarence	Banner
T. E. Smith	Clarence	Banner
L. W. Elliott	Clarence	Banner
Manning Jackson	Clarence	Banner
Eldon Marshall	Clarence	Banner
E. J. Elliott	Clarence	Banner

ANTIGONISH COUNTY.

Name of Competitor	Address	Variety.
Crockett Bros.	Antigonish	Banner
Jas. Dunn	Lr. South River	Banner
John A. McDonald	Maryvale	Banner
Ronald Chisholm	Antigonish	Banner
Alex. H. McPherson	Up. South River	Banner
C. F. Ross	Maryvale	Banner
J. G. Taylor	Antigonish	Banner
John C. Chisholm	Lr. South River	Banner
P. J. Hanrahan	Fairmont	Old Island Black
D. R. Henderson	Copper Lake	Banner

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality	(2) Uniformity of maturity.	Total.
4.5	9.5	4.75	24.	9.	19.	17.	5.	92.75
4.5	9.	5.	23.	9.5	19.	17.	5.	92.
4.75	9.5	4.75	23.5	9.	19.	17.	4.5	92.
4.5	9.5	4.5	23.	8.5	18.	18.	4.5	90.5
4.25	9.	4.5	23.	9.	19.	17.	4.5	90.25
4.25	8.5	4.5	22.	9.	17.	18.	4.5	87.75
4.75	9.	4.75	23.	9.	15.	18.	4.	87.5
3.5	8.	4.5	24.	8.	18.	15.	4.	85.
4.	8.	4.75	21.75	9.5	15.	16.	4.75	84.75
5.	9.5	4.75	23.	9.5	20.	18.	5.	94.75
5.	9.	5.	24.	10.	20.	16.	4.75	93.75
4.5	9.	5.	24.	10.	20.	16.	5.	93.5
4.75	9.	5.	23.	9.5	20.	16.	4.75	92.
4.5	8.	5.	23.75	10.	20.	16.	4.5	91.75
5.	8.5	5.	23.	10.	20.	15.	5.	91.5
4.75	8.5	5.	25.	8.5	20.	15.	4.75	91.5
4.75	8.	5.	24.	9.	20.	15.	5.	90.75
5.	9.	5.	24.	10.	16.	16.	5.	90.
4.75	7.	5.	23.	10.	19.	16.	5.	89.75

Name of Competitor	Address	Variety.
John A. McMillan......	Up. South River..	Banner..........
Dougald Cameron......	Loch Katrine....	Banner..........
Cameron Chisholm.....	Saltsprings......	Banner..........
Ronald W. Chisholm....	Glen Road.......	Banner..........
Wm. C. McIntosh......	Lr. South River..	Banner..........
John A. Gillis..........	Morar..........	Banner..........
John A. Cameron.......	Loch Katrine....	New Market.....
J. G. Hulbert..........	North Lochaber..	Sensation ....
Alex. J. Chisholm......	West River......	Banner..........
John A. McLeod.......	Harbor Road....	Banner..........
John J. Inglis..........	North Lochaber..	Twentieth Cent...
Wm. Walsh............	Fairmont........	Banner..........
Thos. Hogan...........	Harbor Road....	Banner..........
John Cameron.........	Fairmont........	Sensation........
Robt. McNaughton.....	Loch Katrine....	Banner..........
Alex. McPherson.......	Cloverville.......	Banner..........
Herbert Bell...........	Beech Hill.......	O. A. C. 72......
Angus A. McDonald....	Up. South River..	Banner..........
Alex. C. Chisholm......	North Grant.....	Banner..........
D. R. Chisholm.........	Pomquet River...	Banner..........

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total.
4.75	7.	5.	24.	10.	18.	16.	4.75	89.5
4.5	7.5	4.5	23.	10.	20.	15.	4.75	89.25
5.	9.	4.75	25.	8.5	15.	17.	5.	89.25
4.5	8.	5.	21.	10.	20.	16.	4.5	89.
4.	8.	5.	22.	10.	20.	15.	4.75	88.75
4.25	7.5	5.	23.	10.	20.	15.	4.	88.75
4.5	7.	4.5	23.	10.	20.	15.	4.5	88.5
4.5	7.	4.	24.	9.	20.	15.	4.75	88.25
5.	9.	5.	24.	8.	15.75	17.	4.5	88.25
4.	7.	4.5	23.	9.	20.	16.	4.5	88.
4.25	7.5	5.	25.	8.	18.	15.	5.	87.75
4.	8.	5.	21.	9.	20.	16.	4.75	87.75
4.5	7.75	5.	23.	10.	20.	13.	4.5	87.75
4.75	8.	4.5	25.	9.5	15.	16.	4.75	87.5
4.25	7.	5.	24.	10.	16.	16.	5.	87.25
4.	7.	5.	23.	9.	20.	14.	4.75	86.75
4.5	6.5	5.	24.	8.	20.	14.	4.5	86.5
4.75	7.5	4.5	21.	9.5	20.	15.	5.	86.25
4.5	7.	5.	23.	10.	20.	12.	4.5	86.
4.25	8.	5.	22.	8.	20.	14.	4.5	85.75

Name of Competitor	Address	Variety.
Daniel Duggan..........	Beech Hill.......	Banner..........
A. F. McDonald........	Middleton.......	Banner..........
Dougald McGregor.....	Up. South River..	Banner..........
Dan Cameron..........	Farmount.......	Old Island Black.
Hugh McNeil..........	Harbor Centre...	Banner ....
Jas. Carter............	Antigonish.......	Banner..........
Wm. A. McInnis.......	S. Side Cape Geo	Banner..........
John J. Chisholm	Malignant Cove..	Egyptian........
Thos. Brophy..........	Brophy's P. O....	Old Island Black.
Dan McRae...........	Malignant Cove..	Banner..........
Arthur Sutherland......	Copper Lake.....	Tartar King.....
CAPE BRETON COUNTY.		
A. D. Morrison........	Big Pond........	Banner..........
Rod McLeod..........	Grove's Point....	Banner..........
Angus McNeil.........	Big Pond........	Island Black.....
Joseph Campbell, Big Pond Centre........		Banner..........
Edward McLeod.......	Big Pond........	Banner..........
J. W. McIsaac.........	East Bay........	Banner..........
John McMullin........	Geo. River Sta...	Banner..........
D. R. McDonald.......	N. Side East Bay.	Old Island Black.

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of m tutity	Total.
4.	8.	5.	22.	8.	18.	16.	4.75	85.75
4.75	8.	5.	23.	9.	14.	17.	4.75	85.5
4.5	8.	5.	22.	10.	18.	13.	5.	85.5
4.5	7.	5.	24.	9.	17.	14.	4.75	85.25
4.	7.	5.	23.	6.	20.	16.	4.25	85.25
4.75	9.	5.	25.	7.	12.5	17.	4.75	85.
4.	8.	3.	21.	10.	20.	14.	4.75	84.75
4.5	7.	5.	25.	8.	15.	15.	4.75	84.25
5.	6.	5.	25.	10.	18.	10.	5.	84.
5.	6.	5.	23.	8.	18.	12.	5.	82.
5.	7.	4.5	24.	9.	11.	16.	5.	81.5
4.75	9.5	4.5	22.	10.	20.	18.	4.5	93.25.
4.75	9.5	4.25	21.	8.	19.	18.	4.5	89.
4.5	9.	3.5	23.	8.5	17.	18.	4.5	88.5
4.5	9.5	4.5	20.	7.	19.	16.	4.5	85.
3.5	7.	4.5	20.	9.	19.	15.	4.5	82.5
3.5	7.5	3.5	21.	9.	18.	15.	4.	81.5
3.	7.5	4.75	23.	8.	16.	15.	4.	81.25
3.5	7.5	4.5	22.	8.5	14.	16.	4.5	80.5

Name of Competitor	Address	Variety.
Neil J. McIsaac........	Big Pond........	Banner..........
Hugh McKinnon.......	Grove's Point....	Old Island Black.

COLCHESTER COUNTY.

Name of Competitor	Address	Variety.
Geo. Sillery............	Murray's Crossing	Early Blossom...
Arnold Johnson........	Lower Truro.....	Early Blossom...
Blair Cutten...........	Lower Truro.....	Banner..........
J. R. Semple...........	Tatamagouche R.R.1	Banner.......
J. W. Murray..........	Balmoral Mills...	Banner..........
J. L. Cunningham......	Bay Head.......	Banner..........
Alfred Johnson.........	Lower Truro.....	Abundance......
A. B. Cunningham.....	Tatamagouche...	Banner..........
R. D. McKay..........	Balmoral Mills...	Banner..........

CUMBERLAND COUNTY.

Name of Competitor	Address	Variety.
L. W. McFarlane.......	Fox Har, Point...	Banner..........
C. C. McFarlane.......	Fox Har. Point...	Banner..........
H. R. Brown...........	Wallace Bay.....	Banner..........
Chas. R. Robertson.....	Cape Cliff.......	Banner..........
Ter Hersche............	South Wallace...	Banner..........
Van Binzbergin........	South Wallace...	Banner..........
Adam Rancan..........	South Wallace...	Banner..........

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total.
3.	7.5	4.	20.	8.	19.	14.	4.5	80.
4.25	9.	4.5	15.	8.75	15.	15.	4.	75.5
5.	9.75	4.5	23.5	9.25	16.5	18.	4.5	91.
4.75	9.75	4.5	23.	9.75	16.5	17.5	4.75	90.5
4.75	9.5	4.75	21.	9.5	18.5	17.	5.	90.
4.75	9.5	3.5	21.	9.5	20.	17.	4.5	89.75
4.	8.5	4.5	24.	8.	18.5	16.5	5.	89.
4.5	9.	4.5	20.	9.	20.	17.	4.75	88.75
4.	9.25	3.75	23.5	8.	17.5	16.5	4.5	87.
4.	8.	4.5	22.5	8.	18.	16.5	5.	86.5
4.	7.	4.5	23.	8.	19.	16.5	4.	86.
4.5	9.5	4.75	22.	9.75	20.	17.	5.	92.5
4.5	9.5	4.75	21.5	9.75	20.	17.	5.	92.
4.5	9.5	3.5	24.	7.5	17.5	17.	5.	88.5
4.5	9.	4.	21.	9.	16.5	16.	5.	85,
3.5	7.5	4.	23.	6.	16.	16.	4.5	80.5
4.	7.	4.	22.	6.	16.	16.	4.5	79.5
3.	7.	3.	23.	6.	16.	16.	4.5	78.5

Name of Competitor	Address	Variety.
M. B. Harrison........	Athol...........	Banner..........

GUYSBORO COUNTY.

Dan McNeil...........	So. River Lake...	American Banner
Arthur Sinclair.........	Goshen..........	Twentieth Cen...
Michael McIsaac.......	Giant's Lake.....	White Banner....
Alex. T. McBain.......	New Town......	American Banner
J. J. McNeil...........	Giant's Lake.....	White Banner ...
D. N. Cameron........	New Town......	Tartar King.....
Harry Sinclair.........	Goshen..........	American Banner
Vincent McKeen.......	Aspen...........	Tartar King.....
J. F. Forbes...........	Goshen..........	Tartar King.....
Isaac Fisher...........	Fisher's Mills....	Tartar King.....
Mrs. Catherine McLean	Porter's River....	White Banner ...
W. Sutherland.........	Denver..........	Tartar King.....
Arthur Fisher..........	Aspen...........	Tartar King.....
J. A. Sinclair...........	Goshen..........	Banner..........
A. F. McNaughton.....	Goshen..........	Banner..........
Ronald McIsaac........	Giant's Lake.....	White Banner....
John A. McIsaac.......	Giant's Lake.....	White Banner....
Miles McPherson.......	Giant's Lake.....	White Banner....

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total.
3.	6.	3.5	19.	9.75	16.	15.	4.75	77.
4.5	8.75	4.	24.	9.	19.5	17.75	4.	91.5
4.	8.	5.	24.5	9.5	19.	17.	4.	91.
3.75	8.5	4.5	24.5	8.	19.	18.5	4.	90.75
4.	8.	5.	24.5	8.75	19.	16.	4.5	89.75
4.	8.	3.5	24.	8.5	19.	18.	4.5	89.5
4.	8.	4.75	24.5	9.	17.5	17.5	4.	89.25
4.	8.5	4.	23.	9.	19.	17.5	4.	89.
3.5	7.5	4.5	24.	8.	19.	17.5	4.	88.
4.	7.75	4.5	24.	9.5	17.	17.	4.	87.75
4.	8.	5.	23.75	8.	17.	17.	4.5	87.25
3.5	8.	2.75	24.	8.	19.	18.	3.5	86.75
3.75	8.5	4.5	24.	8.	17.5	16.	4.	86.25
4.	8.5	4.5	24.	8.	16.	17.	4.	86.
3.75	6.	5.	24.	9.5	19.5	14.	4.	85.75
3.	7.5	4.75	24.	9.	18.	15.	4.	85.25
3.5	7.5	4.5	22.	8.	19.5	16.	4.	85.
3.5	7.5	3.	24.5	8.	19.	15.25	4.	84.75
3.	7.	4.5	24.	8.	19.	15.	4.	84.5

HANTS COUNTY.

Name of Competitor	Address	Variety.
Sharpe & McNeil	Windsor	Banner
Eas. Karakule Sheep Co.	Windsor	Banner
Wm. Olie	Selmah	Banner
Frederick Baert	Lower Selmah	Banner
J. Swan	Selmah	Banner
Palmer Bros	Windsor Forks	Banner
L. Smith	Maitland	Banner
Mr. Mark	Selmah	Banner

HALIFAX COUNTY.

A. Archibald & Son	M Musquodoboit	American Banner
Robert S. McCurdy	M Musquodoboit	American Banner
Aubrey Archibald	M Musquodoboit	American Banner
C. D. Joudrey	M Musquodoboit	American Banner
Watson Higgins	Newcombs. Cor	American Banner
John Ogilvie	Elderbank	American Banner
E. McL. Benvie	M Musquodoboit	American Banner
A. D. Burris	U. Musquodoboit.	American Banner
Ernest Redmond	Dean	American Banner
Robt. Kaulback	M Musquodoboit	American Banner

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total.
4.	10.	4.5	24.5	8.	19.	18.	4.	91.75
4.5	9.	4.	24.	9.	19.	17.	4.	90.5
4.5	9.	4.	19.	9.	19.	18.	4.5	87.
3.5	8.	4.	23.	7.	17.5	18.	4.	85.
3.5	8.	3.	21.	8.	19.	17.5	4.	84.
3.	8.	3.25	22.	8.5	17.	17.	4.	82.75
3.	7.5	3.5	23.	7.	18.	16.	4.5	82.5
3.	8.	3.5	21.	7.	19.	16.5	4.	82.
4.5	8.	5.	24.5	9.5	18.	18.5	4.5	92.5
4.	7.5	5.	24.	9.5	18.	18.5	4.	90.5
4.	8.	4.5	23.	9.5	18.5	17.5	4.5	89.5
4.	7.5	4.	24.5	9.5	19.	16.	4.5	89.
4.5	9.	3.5	24.	9.	17.5	17.	4.	88.5
3.5	7.5	4.5	23.	10.	19.	17.	3.5	88.
4.	8.5	4.5	23.	9.	17.5	17.	4.	87.5
4.	8.	3.	24.	9.5	17.	17.	4.	86.5
4.	8.	4.	23.	9.	17.	17.	4.	86.
3.5	7.	4.5	23.	9.5	19.	15.	4.	85.5

INVERNESS COUNTY.

Name of Competitor	Address	Variety.
Hugh A. McPherson....	Mabou..........	Granary Filler...
Jas. McLeod...........	West Bay.......	Banner..........
D. F. Beaton..........	Glenora Falls....	Banner..........
Alex. T. Beaton........	Brook Village....	Banner..........
Alex. D. Beaton........	Little Judique....	Banner..........
John A Burton........	N. E. Margaree..	Banner..........
Jas. M. Murphy........	N. E. Margaree..	Banner..........
Rory McLennan........	Dunvegan.......	Old Island Black.
A. Scott McDonnell....	Port Hood.......	Banner..........
Jas. A. Beaton.........	Beatonville......	Kempt..........
Michael Tompkins......	East Margaree...	Banner..........
A. J. Campbell.........	Beatonville......	Early Yielder....
F. A. McKillop.........	S. W. Mabou....	Banner..........
Wm. McLean..........	North Ainslie....	Early Yielder....
L. J. LeBlanc..........	Belle Cote.......	Banner..........
D. D. McDonald.......	Glendale........	Banner..........
John Beaton...........	Black Stone.....	Banner..........
M. McKinnon.........	West Baylentyre	Banner..........
Eddie Smith...........	Black Stone......	Banner..........
Alex. Chisholm.........	Port Hood.......	Banner..........

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total.
4.75	9.5	5.	23.	9.5	19.	17.5	4.	92.25
5.	9.5	4.	24.	9.	19.	17.	4.	9.5
4.4	9.	4.	23.	10.	19.	17.	4.	90.5
4.	8.5	5.	21.	9.75	20.	17.	4.75	90.
4.5	8.	4.5	23.	10.	19.	16.5	4.	89.5
4.25	8.5	5.	23.	9.5	18.	16.5	4.75	89.5
4.	8.5	4.5	23.	9.5	19.	16.	4.75	89.35
4.	8.	4.5	23.	9.5	19.	17.	4.	89.
4.	9.	5.	22.	9.	20.	16.	4.	89.
4.	9.	4.5	22.	9.5	19.	16.5	4.	88.5
4.5	8.	4.5	22.	9.5	19.	17.	4.	88.5
4.75	8.	5.	24.	8.	20.	14.	4.5	88.25
3.	8.	4.	24.	9.5	19.75	16.	4.	88.25
4.5	8.5	5.	22.	10.	18.	16.	4.	88.
4.5	9.	3.	24.	9.5	19.	14.	4.	87.
3.5	8.	5.	22.	9.5	20.	15.	3.	87.
4.5	7.	4.5	22.	9.	20.	16.	4.	87.
4.5	9.	3.	23.	8.	19.5	16.	3.	86.
3.5	8.5	5.	21.	8.	20.	16.	4.	87.6
4.5	7.	3.5	24.	7.	20.	15.	4.5	85.6

Name of Competitor	Address	Variety.
Patrick Gillis..........	Margaree Forks..	Banner..........
Gillis Gillis............	Gillisdale........	Black Oats......
John J. McLellan.......	Glenville........	Old Island Black.
Alex. Rankin...........	Judique.........	Black Tartarian..
John L. Tompkins......	N. E. Margaree..	Banner ....
Duncan McDougall.....	S. W. Margaree..	White Oats......
Hugh A. McLaughlin...	West Bay Centre	Banner..........
D. F. McDonald.......	S. W. Margaree..	Old Island Black.
Alex. K. McKenzie.....	Rear Port Hood..	Banner ....
Ronald McIsaac........	Dunvegan.......	Old Island Black.
Angus J. Boyd.........	Glendale........	Black Tartarian..
Angus R. McDonald....	Broad Cove Chap	
Angus McLean.........	North Ainsley....	Old Island Black.
John C. McInnis.......	North Ainsley....	Black Oats......
A. W. Chisholm........	Margaree Forks..	Banner..........
John D. McGregor.....	North Ainslie....	Banner..........
John B. McLellan......	Glenville........	Old Island Black.
Constant AuCoin.......	Belle Cote.......	Black Side Oats..
Stephen D. Beaton.....	Strathlorne......	Old Island Black.

General appearance considering:— (1) Stand of crop	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality	(2) Uniformity of maturity.	Total.
3.5	7.	4.	23.	9.	19.5	15.	4.	85.
4.	7.	4.75	21.	9.75	19.	15.	4.	84.5
4.	8.5	4.5	22.	10.	15.	16.	4.	83.
4.	8.	4.	22.	7.	19.	16.	4.	84.
4.75	9.5	5.	15.	10.	19.	16.	4.5	83.75
4.5	8.	4.	21.	9.5	17.	16.	3.5	83.5
4.5	9.5	3.	23.	7.	19.5	14.	3.	83.5
3.5	7.	4.5	24.	9.	18.	14.	3.	83.
3.	8.	4.5	21.	7.	20.	15.	4.	82.5
3.	7.	4.5	22.5	9.	18.	14.	4.5	82.5
4.5	8.	5.	22.	7.	17.	15.	4.	82.5
3.	6.	5.	21.	8.	20.	14.	4.	81.
4.75	9.	4.25	15.	10.	16.	16.	5.	80.5
4.	7.	4.	17.	10.	19.	16.	3.	80.
4.	8.5	4.5	23.	7.	12.	16.	4.	79.
4.	8.	4.	20.	9.5	12.	16.	4.5	77.5
4.	8.	5.	10.	10.	19.	15.	4.5	75.
3.	8.	4.	23.	9.5	19.	5.	3.	74.5
4.	7.	2.	21.	8.	10.	14.	4.	70.

Name of Competitor	Address	Variety.
Thos. H. McNeil	Orangedale	Harvested
Robt. McLean	Orangedale	Harvested
Alex. A. Campbell	Beatonville	Harvested

LUNENBURG COUNTY.

Name of Competitor	Address	Variety.
Wallace Rhodenizer	Bridgewater	Banner
Jas. Mader	Pine Grove	Banner
Joe McKay	Up. Northfield	
Albert C. Veniot	West Northfield.	Banner
Scott Hebb	Bridgewater	Banner
Annand Hebb	Hebbville	Banner

PICTOU COUNTY.

Name of Competitor	Address	Variety.
R. D. Ross	Bayview	Banner
R. A. McKenzie	Westville R. R. 1	Abundance
Clifford Langille	Marshville	Banner
Calvin Langille	Marshville	Banner
Eddie Archibald	Alma	Ontario
H. M. Tatarie	River John	O. A. C. 72
Jas. Maxwell	Durham	Banner

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of mtutity	Total
4.5	8.	4.75	24.	10.	18.	17.	5.	91.25
4.5	8.	5.	23.	9.	20.	16.	4.5	90.
4.75	8.	5.	23.	10.	20.	14.	5.	89.75
4.5	7.5	5.	23.	10.	18.	16.	4.5	88.5
4.5	8.	5.	23.	8.	18.	17.	4.5	88.
5.	6.	4.5	23.	10.	20.	15.	4.	87.5
4.25	9.	4.25	23.5	9.5	19.	17.75	4.5	91.75
5.	8.5	3.	24.	9.	19.	18.5	4.5	91.5
4.	8.75	5.	24.	8.5	18.25	17.	5.	90.5
3.75	8.	4.25	24.5	9.	18.5	17.75	4.	89.75
4.25	9.5	4.25	23.5	8.	18.	17.	4.75	89.25
3.75	8.5	4.	25.	8.	16.	19.	4.5	88.75
3.	8.	4.	21.	8.	18.	17.	3.25	82.25

RICHMOND COUNTY.

Name of Competitor	Address	Variety.
Allan McCuish.........	Loch Side.......	Banner..........
W. A. Urquhart........	West Bay.......	Banner..........
John McAulay.........	Grand River.....	Banner..........
D. N. McLeod.........	Louis Cove......	White Wave.....
John F. Matheson......	Grand River.....	White Oats......
Alex. Matheson........	St. Esprit........	White Oats......
John J. Johnston.......	Red Islands......	White Oats......
Duncan McKillop......	Cleveland.......	Banner..........
Peter Sutherland.......	Soldier's Cove....	Banner..........
John J. McDonald......	Soldier's Cove....	Banner..........
Joseph Gillis...........	Soldier's Cove....	Banner..........
G. J. Matheson........	L'Archeveque....	Banner..........
John Sutherland........	Soldier's Cove....	Banner..........
Alex. G. McKay........	Grand River.....	White Oats......
M. E. McNeil..........	Irish Cove.......	Banner..........
Martin Gillis...........	Soldier's Cove....	Old Island Black.
Angus McDonald.......	Soldier's Cove....	
Dan. J. Matheson......	Grand River.....	White Oats
Duncan Matheson......	Grand River.....	White Oats......
A. A. Morrison.........	Lochlomond W...	White Wave.....

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total.
4.	8.	5.	22.	10.	20.	16.	5.	90.
3.5	9.5	5.	24.	10.	17.	16.	4.5	89.5
4.	9.	4.	22.	9.	20.	16.	4.	88.
4.5	8.	5.	22	10.	19.	15.	4.	87.5
4.75	9.5	4.	23.	8.	17.	17.	4.	87.25
4.	6.	5.	23.	10.	20.	14.	5.	87.
4.	9.	5.	21.	8.	19.5	16.	4.5	87.
4.	9.	4.5	24.	10.	15.	16.	4.5	87.
4.5	9.	2.	23.	9.	19.	16.	4.	86.5
5.	10.	2.	23.	9.5	20.	12.	4.	85.5
4.	9.	5.	22.	10.	17.	13.	5.	85.
5.	10.	2.	22.	10.	19.	12.	5.	85.
3.	6.	4.5	23.5	7.	20.	14.	5.	83.
4.	8.	1.	23.	10.	20.	12.	5.	83.
4.	8.	3.	23.	8.	18.	15.	3.	82.
5.	9.	1.	23.	1.	17.	15.	4.	82.
4.	7.	5.	21.	9.5	16.	15.	5.	81.5
4.	9.	3.	5.	10.	20.	17.	4.	72.
4.5	9.	4.	5.	10.	20.	16.	4.	72.
5.	9.5	3.	5.	10.	17.	16.	5.	70.5

VICTORIA COUNTY.

Name of Competitor	Address	Variety
F. A. McRae..........	Baddeck Bridge..	Banner..........
Norman McKay........	Nyanza.........	Banner..........
Farquhar Buchanan....	Baddeck Forks...	Banner..........
Everett Rice...........	Baddeck Forks...	Banner..........
P. K. McIvor..........	Baddeck.........	Banner..........
J. M. Campbell........	W Side M. River.	Twentieth Cen...
A. J. McRitchie........	Baddeck.........	Banner..........
H. G. Matheson........	Hunter's Mount..	Harvested.......

YARMOUTH COUNTY.

John C.Corning........	Chegoggin.......	Banner..........
Adolphus Corning......	Chegoggin.......	Banner..........
A. C. Servant..........	Chegoggin.......	Banner..........
Caleb W. Cook.........	Chegoggin.......	Banner..........
Cann Bros.............	Chegoggon.......	Banner..........
G. M. Spurr...........	Chegoggin.......	Banner..........
Samuel Burrill.........	Brooklyn........	Banner..........
Murray McConnell.....	Chegoggin.......	Banner..........
Chas. Doane...........	Dayton.........	Banner.........

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total.
4.25	9.	5.	23.	9.	19.	17.	4.75	91.
4.25	8.	4.75	24.5	8.	20.	16.	4.25	89.75
4.25	9.5	4.75	24.5	7.	18.	16.	4.75	88.75
4.5	9.5	4.75	21.	9.	19.	18.	4.75	87.
3.5	7.	4.	24.	8.5	19.	14.	4.5	84.5
4.25	7.	4.75	22.	7.	18.	15.	4.75	82.75
2.	5.	5.	25.	8.	20.	7.	4.	76.
5.	9.	5.	23.	10.	19.	19.	4.5	94.5
5.	9.	5.	22.	9.	19.	19.	5.	93.
5.	9.	4.5	24.	9.5	17.	19.	4.75	92.75
5.	9.	5.	24.	9.5	16.	18.5	5.	92.
5.	8.	5.	25.	8.	19.	16.	4.5	90.5
4.5	8.5	4.5	22.	10.	18.	18.	4.5	90.
5.	7.	5.	23.	9.5	20.	13.	4.5	87.
5.	8.5	5.	24.	10.	12.	17.	4.75	86.25
5.	8.	4.5	23.	10.	12.	16.	5.	83.5

POTATOES.

District No. 1, Digby, Yarmouth, Shelburne and Queens Counties.

A. C. Servant..........	Overton.........	Gold Coin.......
Murray Crosby........	Dayton.........	
Caleb Cook............	Cen. Chebogue...	Home Comfort...
Rev. Gordon Lewis.....	Cen. Chebogue:..	New Queen......
Cann. Bros............	Chegoggin.......	Gold Coin.......
Chas. Patton...........	Wellington.......	
Geo. R. Tupper........	Brazil Lake......	Hustler..........
Jefferson Killam........	Cen. Chebogue...	Carman.........
Everett Burrill.........	Brooklyn........	Mills Prize.......

District No. 2, Annapolis, Kings, Lunenburg and Hants Counties.

Jas. Mader.............	Pine Grove......	Mills Prize.......
Wallace Rhodenizer.....	Bridgewater.....	Carman.........
Albert Veniot..........	West Northfield..	Carman.........
Annand Hebb..........	Hebbville........	Mills Prize ......
Scott Hebb............	Bridgewater.....	Carman.........
Joseph McKay.........	Up. Northfield...	Rural Blush......
Henry Newcomb.......	Newcomb.......	Mills Prize ......

Genera appearance considering:— (1) Method of planting, stand of crop.	(2) Vigor of growth, acreage, etc.	Freedom from blight, scabs and insects.	Method of thoroughness of cultivation.	Purity of variety.	Apparent yield considering:— (1) Number and weight of marketable potatoes per hill.	(2) Quality, color, shape and smoothness.	(3) State and uniformity of maturity, and freedom from sunburn.	Total.
7	8	20	20	10	15	10	10	100
7.	8.	18.	19.	9.5	14.	9.	9.	93.5
6.5	7.5	17.	18.5	9.5	13.	9.	9.	90.
6.5	6.75	18.	17.5	9.5	13.	9.5	9.	89.75
6.5	7.	18.	17.	9.	13.5	9.5	8.75	89.25
6.25	7.	16.	18.	9.5	14.	9.	9.	88.75
6.	7.	16.5	16.	9.5	13.	8.5	9.	85.5
6.	7.	17.	17.	7.	13.5	9.	8.	84.5
6.5	7.	17.	14.	7.5	14.	9.	8.75	83.75
5.5	6.5	15.	16.	9.5	12.5	8.	7.5	80.5
6.5	7.75	19.5	19.5	9.5	13.	9.	9.	93.75
6.25	7.5	18.5	19.	9.5	13.25	9.	9.	92.
6.25	7.25	18.5	19.	9.5	12.75	9.	9.	91.25
6.5	7.	18.	18.5	9.5	14.	8.5	9.	91.
6.	7.	18.5	18.	9.5	13.	9.	9.	90.
6.	7.	18.5	18.	9.	12.5	8.5	9.	88.5
6.	6.5	17.5	18.	9.5	12.	8.5	8.5	86.5

District No. 3, Colchester, Cumberland and Pictou Counties.

Name of Competitor	Address	Variety.
John R. Harrison.......	Maccan.........	Carman.........
Jas. W. Maxwell........	Durham	Green Mountain .
William McKenzie......	Westville R. R. 1	McIntyre........
R. D. Ross	Bayview.........	Carman.........
Calvin M. Langille......	Marshville.......	McIntyre. ......
J. R. Hogan	Denmark........	Green Mountain .
Amos Tatarie..........	River John.......	Green Mountain..

District No. 4, Halifax, Guysboro and Antigonish Counties.

Adams Archibald.......	Brookvale.......	Carman.........
Jas. Thompson........	Cloverville.......	Carman.........
A. D. Burris...........	Up. Musquodoboit..	Clark's No. 1..
Alex. C. Chisholm......	North Grant.....	Dakota Red.....
Ernest Redmond.......	Dean...........	Seedlings........
Aubrey Archibald......	M Musquodoboit	Carman.........
Alex. H. McPherson....	Up. South River..	Carman.........
John J. Inglis..........	Lochaber........	McIntyre........
Thos. Kennedy.........	Up. South River,	McIntyre........
Dougald McGregor.....	Up. South River..	Carman.........
Dougald Cameron......	Loch Katrine....	McIntyre........

General appearance considering:— (1) Method of planting, stand of crop.	(2) Vigor of growth, acreage ,etc.	Freedom from blight, scabs and insects.	Method of thoroughness of cultivation.	Purity of variety.	Apparent yield considering:— (1) Number and weight of marketable potatoes per hill.	(2) Quality, color, shape and smoothness.	(3) State and uniformity of maturity, and freedom from sunburn.	Total.
6.75	7.5	16.75	18.5	10.	13.25	9.25	9.5	91.5
6.75	7.75	17.25	18.5	10.	12.75	8.5	9.5	91.
6.	7.5	18.	18.25	10.	12.5	9.5	8.5	90.25
5.5	7.5	17.75	18.	9.5	13.5	9.	9.25	90.
6.5	7.25	19.	19.	10.	12.25	8.	7.5	89.5
5.5	6.5	18.	20.	10.	12.	8.5	8.5	89.
6.	7.5	18.5	16.5	10.	12.	8.	8.5	87.
7.	8.	18.	18.5	10.	13.	9.	9.5	93.
6.75	8.	19.	19.	10.	12.	9.	9.	92.75
6.5	8.	18.	18.5	10.	12.	9.	9.	91.
6.5	7.5	18.	18.	9.75	13.	9.	9.	90.75
7.	8.	19.	18.5	18.5	12.	8.5	9.	90.5
7.	8.	18.	19.	8.	12.	8.5	9.	89.5
6.	6.5	19.	17.5	10.	11.	9.5	9.5	89.
7.	7.5	19.	19.	10.	8.	9.	9.	88.5
7.	8.	19.	19.	10.	8.	8.	9.	88.
6.	6.5	18.	18.	9.	9.	8.5	9.	84.
6.5	7.5	17.	15.	10.	10.	8.	9.	83.

District No. 5, Victoria, Inverness, Richmond and Cape Breton Counties.

Name of Competitor	Address	Variety.
H. A. McPherson.......	Mabou..........	McIntyre........
H. G. Cameron.........	Inverness........	McIntyre........
Angus McPherson......	Port Hood.......	Lincoln..........
Jas. A. Beaton.........	Beatonville......	McIntyre........
Allan McCuish.........	Lochside........	McIntyre........
A. F. Beaton...........	Brook Village....	McIntyre........
John L. Tompkins......	N. E. Margaree..	Blues...........
John J. Johnston.......	Red Islands......	McIntyre........
D. F. Beaton..........	Glenora Falls....	McIntyre........
Andrew McLellan......	Glenville........	McIntyre........
F. A. McRae...........	Baddeck Bridge..	Thorburn........
A. J. Campbell.........	Beatonville......	McIntyre........
John W. McAdam......	Middle River....	Carman.........
Alex. Rankin...........	Judique.........	McIntyre........
Eddy Smith...........	Black Stone......	
John B. McLellan......	Glenville........	McIntyre........
Mrs. D. Campbell......	Margaree Forks..	Blues...........
J. J. McLellan.........	Glenville........	McIntyre........
M. E. McNeil..........	Irish Cove.......	McIntyre........
Jas. A. McDonald......	S. W. Mabou....	Green Mountain..

General appearance considering:— (1) Method of planting, stand of crop.	(2) Vigor of growth, acreage, etc.	Freedom from blight, scabs and insects.	Method of thoroughness of cultivation.	Purity of variety.	Apparent yield considering:— (1) Number and weight of marketable potatoes per hill.	(2) Quality, color, shape and smoothness.	(3) State and uniformity of maturity, and freedom from sunburn.	Total.
6.75	8.	19.	19.	10.	13.	9.	10.	94.75
7.	7.5	18.	20.	10.	13.	8.5	10.	94.
6.	7.75	17.	20.	10.	13.	10.	10.	93.75
6.75	7.5	18.	19.	10.	13.	9.5	10.	93.75
6.	7.75	19.	19.	10.	13.	8.5	10.	93.25
6.75	8.	19.	18.	10.	12.	9.	10.	92.75
6.5	7.5	19.	19.	10.	12.	8.	10.	92.
6.	8.	16.	20.	10.	13.	9.	9.	91.
6.25	7.	18.	20.	10.	10.	9.	10.	90.25
5.5	8.	18.5	19.	10.	10.	9.	10.	90.
6.75	7.75	18.	16.	9.5	12.	10.	10.	90.
6.	7.5	18.	18.	10.	12.	18.5	10.	90.
6.	7.	19.	18.	9.	11.	10.	10.	90.
6.25	7.	16.	19.	10.	13.	9.	9.5	89.75
7.	7.5	18.	18.	9.	10.	10.	10.	89.5
6.	7.75	17.	19.	8.	12.	9.	9.	87.75
6.	8.	10.	19.5	10.	14.	9.	10.	86.5
6.5	7.	16.	18.	10.	11.	9.	9.	86.5
6.	8.	12.	19.	10.	12.	9.	10.	86.
6.	8.75	18.5	16.	17.	10.	10.	10.	86.25

Name of Compet tor	Address	Variety.
John Beaton...........	Black Stone......	McIntyre........
Alex. R. Gillis..........	Margaree Forks..	Blues...........
Alex. D. Campbell......	Beatonville......	McIntyre........
John McMullin........	George's River...	Burbank........
Alex. G. McKay........	Grand River.....	McIntyre........
Michael Tompkins......	East Margaree...	Blues...........
Alex. D. Beaton........	Little Judique....	McIntyre........
Ronald McIsaac........	Dunvegan.......	

General appearance considering:— (1) Method of planting, stand of crop.	(2) Vigor of growth, acreage, etc.	Freedom from blight, scabs and insects.	Method of thoroughness of cultivation.	Purity of variety.	Apparent yield considering:— (1) Number and weight of marketable potatoes per hill.	(2) Quality, color, shape and smoothness.	(3) State and uniformity of maturity, and freedom from sunburn.	Total.
6.5	7.	16.	19.	6.	12.	9.	10.	85.5
7.	7.5	10.	18.5	10.	14.	8.	10.	85.
6.	7.	16.	17.	8.	12.	8.5	10.	84.5
6.5	8.	18.	19.	9.	5.	8.	10.	83.5
6.5	8.	10.	20.	9.75	10.	9.	10.	83.25
6.5	6.	8.	18.	9.5	12.	9.	10.	79.
4.	8.	10.	15.	7.	10.	8.	10.	72.
6.	6.	8.	10.	9.	8.	8.	9.	64.

TURNIP COMPETITION 1916.

Antigonish County.

		Yield per Acre		
John J. Brown, West Lochaber	83.5	800	1st	$75.00
A. Harold Baxter, Addington Forks	82	900	2nd	50.00
John M. McGregor, Upper South River	81.5	913	3rd	30.00
Joseph Dunn, Lower South River	81	725	4th	20.00
Geo. Roy Inglis, North Lochaber	77.5	850		
Dougald Cameron, Lower South River	77.25	750		
Fred Deon, Pomquet	76	575		
John C. Chisholm, St. Andrews	74.75	550		
Harold Irish, Afton	73	775		
Dougall C. Gillis, Georgeville	72¾.75	500		

Colchester County.

Graham Yuill, Truro, R. R. L.	91	1225	1st	75.00
Saxby Blair Semple, Tatamagouche	90.5	1050	2nd	50.00
Harold B. Bowers, Great Village	90.	1275	3rd	30.00
Frank S. Crowe, Old Barns	89.25	1225	4th	20.00
Roy Vance, Masstown	84.5	950		
Elmer McG. Johnson, Stewiacke, Cross Roads	82.5	950		
Chas. E. Layton, Great Village	81.5	1025		

Guysboro County.

Ralph Forbes, Goshen	85.25	1050	1st	75.00
Har'd McNaughton, Goshen	83.	950	2nd	50.00
Jerry B. McNeil, Giant's Lake	77.5	775	3rd	30.00
Eddie Whidden, Glenelg	75	600	4th	20.00
Duncan McIsaac, Lakedale	74.75	575		
Duncan A. McIsaac, Giant's Lake	71.5	875		
Ernest Arch'b'l'd New Town	70.	450		
A. C. McIsaac, Giant's Lake.	68.5	550		

Inverness County.

J. C. F. McDonnell	85.9	1150	1st	75.00
V. J. Coady, N.E. Margaree	84.1	1150	2nd	50.00
P. J. Tompkins, E. Margaree	80.75	975	3rd	30.00
Richard Anderson, Mabou	80.	850	4th	20.00
Martin Murphy, N. E. Margaree	78.45	950		
R. D. Miller, Mar. Forks	78.1	800		
J. D. Beaton, Black Stone	76	800		
C. McKillop, S. W. Mabou	7.45	725		
Chas. B. Smith, Glendyer	73.3	725		
Harold S. C. McDonald, Glendyer	72.75	700	(estimated)	
Albert McDaniel, Margaree Forks	70.	500		
P. McPhee, Mabou Harbor	69.5	500		
J. R. Gillis, Margaree Forks	67.4	425		

REPORT OF DEMONSTRATION WORK IN CAPE BRETON.

Prof. M. Cumming,
Secty. for Agriculture,
Truro, N. S.

Sir:—

I have before me Mr. H. S. Cunningham's report as Agricultural Representative for the Cape Breton Counties.

As this report is too lengthy to be included in your report in full, I would like to mention a few of the more important features.

In addition to having charge of twenty-two demonstration turnip plots in different parts of the Island Mr. Cunningham conducted a number of experiments with lime and marl applied in varying quantities, and at different dates, as a prevention of club root in turnips, and also to ascertain to what extent other crops are benefited by its use. As ground lime stone is rather slow in its action no definite results can be announced. Indications are, however, that wonderful results may be expected from the use of lime as a preventative of club root in turnips, and that beneficial results were obtained by its use on other crops. Mr. Cunningham takes this opportunity of stating that lime is not a plant food and warns farmers against a tendency on their part to accept it as a "panacea for all their ills." The details of the work in connection with the turnip plots was largely in the hands of Mr. Cunningham's assistants, Mr. H. B. Langille and Mr. T. C. Munn, a very complete report of which is to hand. The gratifying feature of this work is that a large number of farmers are taking an interest in this work and are growing turnips quite extensively. A review of the results reveals the fact that conditions in Cape Breton compare favorably with other parts of the Province. For example the average yield of twenty-two plots situated all over the Island and under all sorts of conditions was practically 900 bushels per acre, nine plots exceeded 1000 bushels per acre and three exceeded 1200 bushels per acre, while the maximum crop was 1400 bushels.

In addition to the turnip demonstration plots Mr. Cunningham devoted some time to the promotion of school garden work and school affairs. In view of the demand for greater production and a decrease in our "able bodied men" this work deserves greater attention in future. Among the other lines of work which received attention were experiments in potato spraying, making of drainage surveys, milk testing, pioneer work in connection with the government creameries. In fact no request for assistance in any line of farm operation was neglected, In closing, Mr. Cunningham desires to thank his assistants for their untiring efforts to make their work a success.

Should any reader care to have the results of any particular line of work complete copies of the reports are on file in this office.

Respectfully submitted,

F. L. FULLER.

REPORT ON EXHIBITIONS.

Prof. M. Cumming,
Secty. for Agriculture,
Truro, N. S.

Sir:—

I have the honor to submit my eighth annual report of County and district exhibitions.

During the past year thirteen of the most successful County and District Exhibitions ever held in this Province have handed in their reports.

A comparison of the statements for the two years reveals the fact that not only was there more prize money offered and a larger number of exhibits, but also a large increase in the attendance.

While this is to some extent due to the general growth and an increasing interest in these important institutions but, is also due in a large measure to the delightful weather which prevailed generally during the period when these "Fairs" were held.

At the beginning of the season "Fair Boards" were inclined to be pessimestic about the outcome under prevailing conditions. The hearty support of both exhibitors and visitors have relieved exhibitions managers of much anxiety regarding the future and at the same time demonstrated the regard these institutions held generally as a means of promoting production, which is such an important factor at the present moment.

Personally I am convinced that the spirit of friendly competition which prevails at these fairs is in no small small degree responsible for the present demand for better Live Stock and improved Seed.

As in the past the Department of Agriculture have supplied expert judges for all "the live stock" classes and the agricultural products. I am convinced that nothing has done as much towards the present success of the county exhibitions as having the prizes awarded by disinterested and expert judges.

As Prize Lists for next year's fairs are now under consideration I am now endeavoring to combine classes and extend the number of prizes awarded. It is hoped by this means we can overcome the difficulty judges meet in classes where there is little or no competition.

For example it would be far more satisfactory for a judge, and of vastly more interest to exhibitors and the public to have the judge to place fifteen awards in a class of twenty-five animals than it would to have the judge place three awards each in five classes containing five animals each. We hope that some of the Fair Boards will give this method a trial during the coming season.

A list of exhibitions together with the statements covering main features will be found in the following table.

Respectfully submitted,

F. L. FULLER.

Exhibitions 1916.

COUNTY	TOWN	SECRETARY	Gate Receipts	No. of Exhibits	Prize Money	Total Receipts	Total Expenditure
Antigonish.......	Antigonish.....	Allan McDonald..	$ 520.05	1400	$ 833.51	$1530.56	$1405.91
Cape Breton.....	Sydney........	D. R. Nicholson...	4203.36	3230	3060.60	7081.00	6260.25
Colchester and East Hants...	Stewiacke.....	A. D. Fulton......	607.60	2250	1321.50	2048.97	2098.97
Digby..........	Bear River....	C. F. McDormand.	224.00	2284	239.00	786.74	691.72
Guysboro........	Guysboro......	H. M. Scott......	312.00	1100	705.15	1248.52	1221.15
Halifax..........	Musquodoboit	Chas. Logan......	624.05	980	900.45	1927.44	1449.36
Inverness	Inverness	Dan. A. McIsaac..	1000.00	763	641.80	2435.07	1927.13
Mun. of Clare....	Little Brook...	Arnaud S Comeau.	212.00	780	330.80	530.40	613.30
Lunenburg......	Bridgewater...	R.B.H. Robertson.	2118.90	2043	1204.25	4576.85	3276.85
Queens..........	Caledonia.....	Fred Kempton....	489.35	900	408.10	908.34	820.33
Richmond.......	Arichat.......	A. E. Morrison ...	283.00	....	418.05	785.30	643.00
Shelburne.......	Shelburne.....	Wm. K. Hood....	291.08	1400	524.51	1011.36	825.29
Yarmouth.......	Yarmouth.....	Wm. Corning.....	1972.25	2302	2116.85	4746.66	4639.66

Prof. M. Cumming,
Secty. for Agriculture.
Truro, N. S.
Sir:

I have the honor to submit my seventh annual report o the County Farmers' Associations.

During the year two Associations failed to get a sufficient number of members to qualify for their grant and two new Associations were organized, therefore the number still remains at thirteen. The total membership is 1520, an increase of 326 over the previous year. There were somewhat fewer meetings held under the auspices of these Associations than formerly but a higher average attendance is maintained. The reason for the decrease in meetings thus reported is that with the growth of the Agricultural Department each branch to a large extent, arrange its own meetings. Therefore we have a series of "Dairy Meetings," "Poultry Meetings", "Live Stock Meetings," Horticultural and Entomological meetings addressed by various experts which are not reported under these Associations.

A year ago it was intimated that these Associations might become County Co-operative buying and selling organizations. However, any efforts towards incorporation have seemed to indicate that for such purposes these Associations would not be satisfactory. Therefore instead of becoming incorporated themselves they have in several instances been the means of organizing several legally constituted co-operative bodies for which they nominally at least—stand sponsor. While there are many reasons from a business standpoint why a County Association with a widely scattered membership embracing a great variety of interest might be unsatisfactory as a purely business organization, there would seem to be every reason to expect that they will become centres through which the several business organizations in each county will help to keep in touch with one another.

In addition to other work several County Associations conduct county and district exhibitions and seed fairs. Others hold monthly meetings where important agricultural matters are dealt with. Furthermore through their representatives to the Provincial Association the whole province is kept informed, and take part in all measures pertaining to their welfare.

Respectfully submitted,

F. L. FULLER.

COUNTY ASSOCIATIONS.

COUNTY	No. of Members	No. of Meetings	Total Attendance	Average	Total Receipts	Total Expenditure	Balance
Annapolis							
President, V. B. Leonard, Clarence; Vice-President, Fred H. Johnson, Bridgetown; Secy-Treasurer, L. W. Elliot, Clarence..........	105	29	4410	152	$111.58	$ 56.28	$55.30
Antigonish							
President, A. S. McMillan, Antigonish; Vice-President, Wm. Vinten, Antigonish; Secy-Treasurer, Duncan Chisholm, Antigonish..........	50	....	....	....	1530.56	1405.91	124.65
Cape Breton.							
President, R. B. Murray, Coxheath; Vice-President, J. Webster Allen, North Sydney; Secy-Treasurer, R. M. Jackson, Jacksonville..........	358	5	152	30	519.74	139.90	379.84

Cumberland							
President, Samuel Freeman, Amherst; Vice-President, C. E. Davidson, Halfway River; Secy-Treasurer, C. H. Black, No. 208 Victoria St., Amherst	145	9	231	26	102.38	81.95	20.43
Digby.							
President, Wm. A. Bacon, Digby; Vice-President, Jas. Trevoy, Brighton; Secy-Treasurer, Frank W. Nichols, Digby	170	10	309	31	152.10	148.50	3.60
Guysboro							
President, D. P. Floyd, Guysboro; Vice-President, Wm. A. Atkins, Guysboro Intervale; Secy-Treasurer, Stanley Lipsett, Manchester	122	New	....	....	....	....	......
Inverness							
President, D. F. McLean, Port Hood; Vice-President, Jas. Gillis, S. W. Mabou; Secy-Treasurer, A. J. Campbell, Beatonville	53	.....	....	....	99.78	54.74	45.04
Kings.							
President, Prof. W. S. Blair, Kentville; Vice-President, Henry Watts, Waterville; Secy-Treasurer, W. H. Woodworth, Berwick	65	16	613	38	91.33	68.63	22.69

COUNTY ASSOCIATIONS (*Continued*).

COUNTY	No. of Members	No. of Meetings	Total Attendance	Average	Total Receipts	Total Expenditure	Balance
Lunenburg.							
President, A. W. Dauphinee, New Cornwall; Vice-President, Scott Hebb, Bridgewater; Secy-Treasurer, J. L. DeLong, Barss Corner..................	84	.....	....	....	139.16	60.62	78.54
Pictou							
President, W. S. Munroe, Bayview; Vice-President, R. A. Robertson, Salt Springs, R. R. 1; Secy-Treasurer, C. A. Maxwell, Salt Springs R. R. 1.........	50	3	77	26	148.42	42,94	105.48
Richmond.							
President, Rev. J. E. Robitaille, P. P., West Arichat, Vice-President, Rev. R. L. McDonald, St. Peters; Secy-Treasurer, A. E. Morrison, Point Tupper....	97	18	1725	96	94.75	99.00	4.25

Victoria							
President, W. A. K. McKenzie, Nyanza; Vice-President, Alex. J. Grant, Garry Middle River; Secy-Treasurer, H. G. Matheson, Hunter's Mountain...	58	New	....	....	....	....	......
Yarmouth							
President, Rev. G. T. Lewis Yarmouth R. R. 2; Vice-President, Geo. M. Spurr, Chegoggin; Secy-Treasurer, S. P. Goudy, Yarmouth..................	165	16	1380	86	97.57	94.81	2.76

PART III.

INTRODUCTION.

It is not easy to form an accurate idea of the extent to which fruit is grown in Nova Scotia. Certain facts about fruit growing, as an industry by itself, are very well known. For instance, we learn from the report of the Chief Fruit Inspector for the Province that the average sales of apples shipped abroad and of apples sold in the local markets each year for the 5-year period 1910-15 was 786,633 barrels. The largest crop in the history of the Province was in 1911 when 1,734,872 barrels were packed and sold. The next largest crop was in 1912 when 993,338 barrels were sold. The average for the past 4 years has been about 713,000 barrels. But these figures refer only to a part of the western section of the Province where fruit growing is carried on largely as an industry by itself. They do not include the apples grown in Eastern Nova Scotia, sold locally, or those consumed all over the Province at the homes where they were produced.

The Census Returns for 1911 give 1,666,977 bushels or 666,790 barrels, as the yield of apples for the Province in 1910. That season happened to be one of the most unfavorable for apples for a long time and the yield, one of the lowest in a number of years. According to the Fruit Inspector's Report only 323,535 barrels were sold from the 1910 crop in the western part of the Province. If the Census figures are trustworthy they are much lower than would correctly represent the yield over the whole Province in most years. What that yield is, we have, at present, no means of finding out accurately.

The yield of pears for 1910 is given by the Census Returns as 23,506 bushels, the yield of plums as 16,984 bushels, cherries 10,004 bushels, peaches 1,043 bushels and other fruits 1,580 bushels. For the tree fruits other than apples 1910 was also a poor year.

The number of apple trees of bearing age reported by the census in 1911 was 1,596,056, of non-bearing age 884,984, making a total of 2,481,040 apple trees all told. If there are 50 trees to the acre, on an average, there would be about 50,000 acres of apple orchard in Nova Scotia. The Census for 1901 gives 1,203,745 bearing apple trees and 771,830 non-bearing apple trees, making a total of 1,975,575 or the equivalent of about 40,000 acres of apple orchard in 1901. This would show an increase in ten years of 505,465 apple trees or an increase of about 10,000 acres in apple orchard.

No separate statistics are available for the yields of the different small fruits in Nova Scotia. Of these the strawberry is the most important from a commercial point of view, being grown for the local market and for export. The cranberry also is a fruit of commercial importance for which the census gives no statistics. It is estimated by one who is in a good position to know that the total area of cranberries in cultivated bogs in the Province exceeds 300 acres. In 1915 it was estimated that the total yield exceeded 6000 barrels. In one season 5000 barrels were shipped from one railway station alone. Raspberries, blackberries, gooseberries and currants are grown for the local market.

Of the wild fruits the blueberry and the cranberry are important in Nova Scotia, the former, in favorable seasons, being exported in considerable quantities to the Boston market from the western part of the Province. Wild strawberries, raspberries and blackberries are widely distributed furnishing a supply for home use to those who take the time to gather them.

To some apple growers who have had poor results from their orchards in the past few years this may not seem the proper time to issue a report such as this on fruit growing. The present Report is a revision of the one written in 1910, which is now exhausted. Since then there have been good years for the fruit grower and poor ones. A glance at the history of the apple industry of Nova Scotia will show that fluctuations in the business are to be expected, and that good years regularly follow poor years. In the past the apple grower has had his fair share of prosperity, to say the least, along with other farmers. Notwithstanding the unsettled conditions of business, which may possibly follow the closing of the war, the place of the apple among the necessities of life has become so well established and the strategic situation of the Nova Scotia fruit growers is such that there should be nothing in the future for them to fear. On the contrary it would seem that now is the time to take good care of orchards and for those whose conditions and circumstances allow to plant more orchards and be ready for the larger business that is likely to come.

To those who have kindly contributed articles for this report or rendered assistance in other ways I wish to express my sincere thanks.

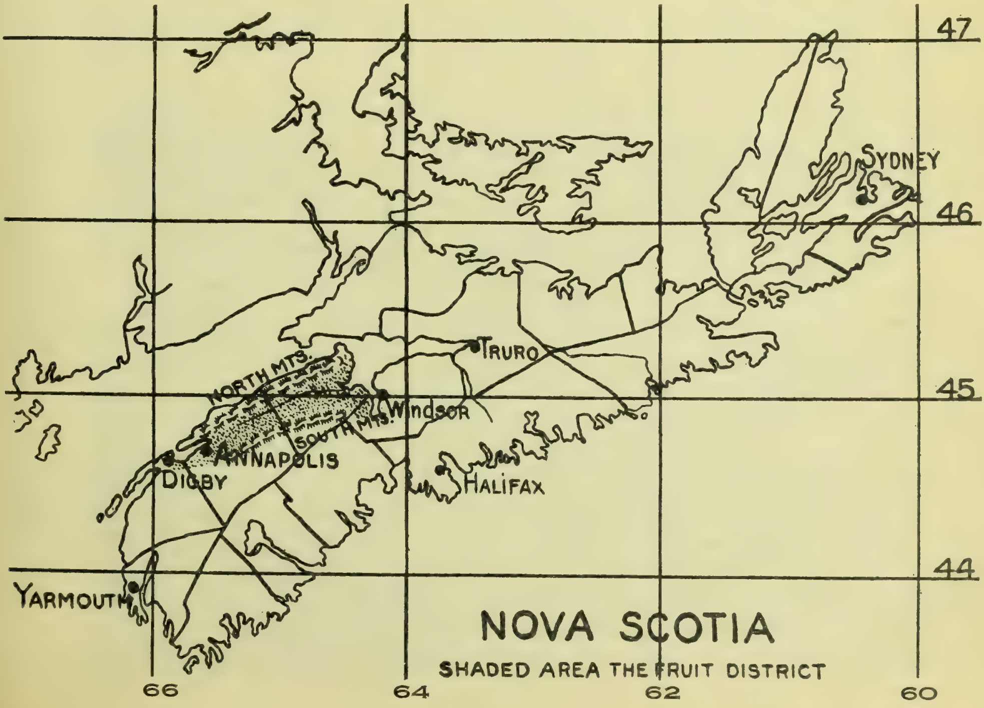
P. J. SHAW.

FRUIT GROWING IN NOVA SCOTIA.

P. J. Shaw.

The Province of Nova Scotia consists of a peninsula jutting well out into the Atlantic, together with the Island of Cape Breton. It extends in a north easterly and a south westerly direction for a distance of nearly 400 miles, the peninsular portion being divided into two nearly equal parts by the 45th parallel of north latitude. The western part of the Province, which lies mostly south of this parallel and is probably influenced to some extent by the Gulf Stream, has a soil and climate well adapted to the culture of many kinds of farm crops, including most of the fruits of the temperate zone. The eastern part, including the island of Cape Breton, lies mostly between the 45th and the 47th parallels and has a somewhat colder climate with shorter growing seasons. This part of the Province, while in many places well adapted for general farming and for some kinds of fruit growing, is not as a rule as suitable for the growth of the tree fruits as is the western section.

The cultivated fruits grown in Nova Scotia comprise nearly all those of the temperate zone. These include the orchard or tree fruits, the small fruits, the grape and the cranberry. The orchard fruits include the apple, pear, plum,



cherry, peach and quince. The small fruits include the strawberry, raspberry, blackberry, gooseberry, and currant. These do not all succeed equally well in Nova Scotia. On account of the severity of the winters and the lack of heat at the time of ripening, grapes and peaches grow only in the warmer parts of the Province. Pears and quinces succeed only in the best fruit sections, while apples, plums, and cherries have a wider range, thriving in favored localities over the whole Province. The small fruits do well from one end of Nova Scotia to the other.

Fruit growing as an important branch of farming is carried on chiefly in a small section of the western part of the Province known as the Annapolis Valley. This section really comprises the valleys of several streams emptying into the head waters of the Bay of Fundy, of which the Annapolis, Cornwallis, Gaspereaux and Avon Rivers are the chief. It is protected from the north and north-west winds by a range of hills 500 to 700 feet in height, called the North Mountain. It is sometimes spoken of as the fruit district of Nova Scotia and lies between the town of Windsor on the east and Digby on the west, being about 100 miles in length and from 6 to 10 miles in width.

The apple is the most important fruit grown in the Annapolis Valley. This is not only because the soil and climate are favorable for its culture but because it can be shipped abroad and be sold in the markets of the world. Other fruits can be grown as easily but being perishable their sale is chiefly limited to the local markets, which are small in comparison with the possible production. Apples, on the other hand, can be, and are shipped from Nova Scotia to the Canadian West, to Newfoundland, Europe, the West Indies, South America and South Africa. In seasons of normal yields from seven eighths to nine tenths of the crop is exported.

The Annapolis Valley fruit grower is thus limited to the apple as a fruit which can be grown on an extensive commercial scale. This, however, is not without its advantages. A community of interest is created where people living in close proximity are engaged in the same kind of production. One grower learns from the experience of another. Agencies for the diffusion of information relating to the industry are more easily maintained and facilities for furnishing the necessary supplies, such as fertilizers, spray materials and packages are more likely to be available than if there were a greater diversity of interests and employment. The growers are more apt to concentrate their efforts in the attempt to study and master their problems than they are when it is easy to change from one thing to another.

View of the Annapolis Valley Looking South From Mr. Ray Clarke's Farm, Lakeville.

Diversified Farming in the Annapolis Valley.

The apple industry of the Annapolis Valley began as a side line to general farming. The young orchards were manured and cultivated incidentally while they were devoted to hoed crops or took their places in the general system of rotation of grain, grass and hoed crops. As the orchard area increased and the trees grew to bearing age they required more and more attention. The apple crop took more time to harvest. With the increase in orchard pests, the necessity for spraying became greater. Thirty years ago practically no spraying was done. Then came the hand pump followed soon after by the power outfit. This matter of spraying took time and labor. The more capital invested in spraying apparatus and other orchard equipment the more inducement to extend the orchard area in order to make this equipment pay. The British and foreign markets appeared to furnish an unlimited outlet for apples. The apple industry of the Annapolis Valley increased gradually in importance as compared with other branches of farming. The general farmer and the potato raiser of fifty years ago finally developed into the apple grower of today.

As the orchard area increased, the quantity of live stock in this section decreased both relatively to the area in orchard and absolutely. The orchards therefore soon outgrew the supply of barnyard manure. About this time the large business in commercial fertilizers began to develop and the Annapolis Valley apple growers became the first extensive users of fertilizers in the Province. For some time doubts were entertained as to whether the fertility of orchard lands could be permanently and profitably maintained with commercial fertilizers. But experience has shown that these doubts were groundless. Not only has it been proved that orchards can be grown on commercial fertilizers and cover crops but that bearing orchards can thus be maintained in a profitable state of productiveness. Hence the acreage of orchard which a grower can maintain is not limited by the amount of live stock which he can keep. In sections of the fruit district in which the apple crop seldom fails farmers who have the capital and the taste for orcharding may safely devote their whole attention to this branch of the industry.

The Outlook for Fruit Growing.

It is reasonably sure that the demand for all kinds of fruit will continue to increase. Some people live where certain fruits do not thrive, as, for instance, in the Prairie Provinces. Some are too much engaged in other business to be able to grow the fruit which they require. Others live in cities where it is not convenient or possible to grow fruit. The city population is increasing rapidly. In fact, the non-fruit growing part of the population is increasing much more rapidly than that engaged in fruit raising. Even though the acreage in tree fruits has increased lately at a more rapid rate than ever before, the fruit consuming part of the population has probably kept pace with this increase in orchards. It is therefore likely that the demand for fruit will continue to grow as fast at least as the growth of the orchard area. Furthermore, apples and some other fruits can be grown in Nova Scotia as cheaply as anywhere in the world. Land is not expensive and labor can be had at reasonable cost. The climatic conditions are favorable for fruit growing. Fertilization of the ground is usually necessary but irrigation is not required. Certain orchard pests are not as abundant nor as difficult to control here as elsewhere. Orcharding can be carried on in conjunction with other lines of farming; it may be a side line or it may be the chief or the only branch of farming in which the owner engages. The conditions are such that the fruit growers here are able to compete in quality and cheapness of production with those of any other fruit growing section of America.

The Maritime position of Nova Scotia and its nearness to Europe make it possible to put fruit from this Province on the important world markets at the minimum cost. A rail haul of from fifty to eighty miles brings the apples for export to the seaboard. Water transportation for the remainder of the distance greatly reduces the cost of freight. Besides, the growers and shippers have the advantage of good organization and long experience in marketing.

The prediction is sometimes made that the market for fruit will soon be overstocked and that the grower will not be able to sell his crops at paying prices. This prediction is as old as the fruit industry itself and is apparently now no nearer to fulfillment than when it was first made. There have been years of low prices for fruit, and no doubt such years will come again. In 1896, twenty years ago, there was an enormous crop the world over and a year of ruinously low prices. If such conditions recur, prices may be low again. But growers and shippers now know more about the business of marketing fruit. If such an abundant yield should again be produced only the best fruit would likely find its way to the market. The inferior grades would be used in the canneries, the evaporators, the vinegar factories, fed to stock or left on the ground to rot.

But years of low prices are not always as unprofitable as they seem. When fruit is abundant and cheap more persons buy it and discover the advantages of eating fruit. They acquire a taste for it which results in an increased demand in succeeding years. Periods of low prices help to advertise and popularize the sale of fruit.

To obtain a correct idea of the progress and probable future of the fruit industry of Nova Scotia it is necessary to take a view of the yields and prices over a period of several years. Since both yields and prices fluctuate from year to year a better idea is obtained by taking five-year averages than single years for comparison. This was done by Mr. R. S. Eaton in 1910 in an article giving an optimistic survey of the apple industry. The five-year averages for the exports of apples for the thirty years preceding 1910 were given as follows:

1880–1885	23,920	barrels
1885–1890	83,249	"
1890–1895	118,552	"
1895–1900	259,200	"
1900–1905	330,406	"
1905–1910	480,298	"

Taking 50 per cent as the probable rate of increase for the immediate future Mr. Eaton estimated that the exports for the next few years would be as follows:

1910–1915	723,447	barrels
1915–1920	1,085,170	"
1920–1925	1,627,765	"
1925–1930	2,441,298	"

The yields for the principal fruit producing sections of the Province for the first five years of this 20-year period, as given by Mr. G. H. Vroom, Chief Dominion Fruit Inspector were as follows:

1910	323,535	barrels
1911	1,734,872	"
1912	993,338	"
1913	650,900	"
1914	980,520	"

Deducting 150,000 barrels for apples sold in the local markets each year, which is a liberal estimate, the exports from the Province in these 5 years would be:

1910	173,535	barrels
1911	1,584,872	"
1912	843,338	"
1913	500,900	"
1914	830,520	"

This gives us an average of 786,633 barrels for the yearly export from the Province which is somewhat better even than Mr. Eaton's estimate in 1910. It will be seen then that the exports of apples from Nova Scotia, looked at over a period of years, show a steady increase and that the rate of increase in later years is fully up to or better than that of many former years.

From the standpoint also of prices paid to the grower the prospect for the apple industry is encouraging. The returns to the members of one of the leading fruit companies for No. 1's of ten leading varieties for the five years preceding the outbreak of the war were as follows:

Years	Gravenstein	Blenheim	Ribston	King	Baldwin	Stark	G. Russett	Spy	Ben Davis	Nonpareil
1909	$2.47	$2.91	$2.58	$2.91	$2.54	$2.57	$2.87	$2.79	$2.05	2.61
1910	3.44	2.91	3.23	3.08	3.36	3.34	3.77	3.84	2.87	3.96
1911	1.71	1.73	1.47	2.30	2.30	2.17	2.40	2.53	1.91	.....
1912	2.07	1.80	1.51	2.25	1.80	2.05	3.05	2.25	1.65	2.20
1913	3.26	2.52	2.03	2.84	3.51	3.60	4.60	3.50	3.51	4.15
Average	2.59	2.37	2.16	2.67	2.70	2.74	3.33	2.98	2.39	*3.23

The above prices were paid to members of all the subsidiary companies of the United Fruit Companies after its formation in 1911 and may be taken as fairly representing the prices obtained for apples by most growers in the fruit district in those years. No record of the prices received by growers thirty or forty years ago is at hand but many readers who remember what apples then sold for will agree that there has been little if any falling off in prices in late years.

Under the conditions of the war with ocean traffic uncertain and freight rates phenomenally high many persons expected that prices would be low. On the contrary, however, up to the present, prices have averaged as high as for the five years immediately preceding the war, whatever they may be before it closes.

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* NOTE—Average for four years only.

The Uncertainty of the Apple Crop.

In a considerable section of the fruit district, consisting of the lower area lying almost throughout the central part of the Annapolis Valley, the orchards do not yield as regularly as do those situated on higher ground on each side of the Valley. In years when the conditions are favorable these orchards give large crops. But in years when the total production of the fruit district is small, as in 1910, 1913, 1915 and 1916, many orchards in this part of the Valley give small crops or none at all.

Why do Trees Fail to Bear?

The question is sometimes asked, Why do trees fail to bear regularly or sometimes fail to bear at all? There are many reasons, any one or a combination of which might cause trees of bearing age to fail to produce a crop. In the first place, in order to have fruit in a given year, the fruit buds must have been formed in the preceding year or no blossoms and consequently no crop could be produced that year. In the second place, even if fruit buds are present, the trees must be healthy and vigorous if they are to yield crops in seasons when the weather conditions are not the most favorable. The orchard may need cultivation or fertilizing or both. The crop may fail or be greatly lessened because of the attacks of certain insects or of plant diseases, such as the cankerworm or the apple scab. The trees may lack proper cross pollination due to the absence of other varieties, or of bees to carry the pollen from flower to flower. Even if none of these conditions prevail the weather just before or during the blossoming of the fruit may be such that the crop will fail. Sometimes a frost may occur at blossoming time or shortly before which may kill the pistil in the bud. Or the weather may be cold, cloudy and wet at blossoming time and thus prevent the proper pollenization of the flowers and the setting of the fruit. Fruit growers should cultivate, fertilize, prune and spray their trees before they complain of non-bearing. Even after the owner has done his part to the fullest extent, failure, due solely to weather conditions, may still occur. It seems likely that the failure of apple crops in the fruit district in recent years has been due more to seasonal causes than to anything else. Well cared for orchards as well as others have failed to yield crops in certain years. Failure occurs chiefly on the low area in the central part of the Valley, often in well cared for orchards, while orchards not as well cared for but on higher elevations have borne good crops.

The only remedy is for the intending fruit grower to locate, if possible, on the higher ground to reduce the likelihood of failure to a minimum.

Other Lines of Farming to Accompany Orcharding.

The question often arises as to whether the Annapolis Valley fruit grower would not be wise to combine other lines of farming with his apple growing. To the outsider, the one unacquainted with the conditions, it would seem that live stock, such as dairy or beef cattle, or sheep, might be extensively kept and that the work would be complementary to that of orcharding. The cattle would produce the manure which would build up the soil for the trees. They would provide work for the hired help the year round and bring in a more regular and steady income.

The first thing to notice is that the fruit growers of the Annapolis Valley or their fathers were once live stock men engaged in diversified farming and that there was a gradual change from this type of farming to fruit growing. As long as the conditions which led them to change from this diversified farming to apple culture exist there is not much likelihood of their going back to this kind of farming. Whether those conditions do still exist may be open to question.

In the second place, the problem is not quite as simple as it looks. To the onlooker, it would seem that the fruit grower could grow much of his feed for his cattle and attend to his cows while his apples are growing. The assumption is that the apple grower has nothing to do but pick his crops or at any rate very little to do after the first spring cultivation until the crop is ready to harvest. On the contrary, if the orchard is even of moderate size, producing about a thousand barrels of apples a year, the owner with a hired man will be fully occupied throughout most of the growing season. In apple picking time several extra hands will be required if the crop is to be harvested without loss. Some of the operations, like spraying, must be done exactly on time or as nearly so as the weather permits and with thoroughness, or there will be a loss. Spraying interferes with the sowing of grain and picking interferes with the harvesting of grain and potatoes.

Again, the apple grower who has an orchard of fairly good size is required to equip his farm with expensive machinery and materials for his special line of business, and must set aside some of his best land for his fruit plantation. Land which is devoted to a bearing orchard is not of much use for the growth of other crops, such as feed for live stock. It is only in young orchards that such crops may be grown advantageously. It would greatly increase his expenditure if he had to provide additional special equipment for other lines of farming as well as for apple growing. Take, for example, the matter of fences required in live stock farming. These represent a large outlay, both of capital and labor. The fruit grower can usually dispense with them and devote the equivalent effort to some phase of his own special work. He may, it is true, carry on other lines of farming with his apple growing but he must either reduce his apple growing within certain limits—say a production of one thousand barrels a year or less—or he must plan to carry on a double line of farming, requiring a greater amount of capital, of labor and of supervision, which is the equivalent of operating two farms devoted to two distinct lines of farming. Many fruit growers would prefer to extend their present fruit plantations and devote undivided attention to one line of work. If they are situated where their crops are likely to be fairly regular and have the capital to carry themselves over poor years, when such occur, this is what they should do. Especially is this true on farms which are not well supplied with natural hay land and pasture.

But what about the man who is situated where the orchard can not be depended upon to yield good crops more than three years out of five or possibly not that? Prices are apt to be low when he has a good crop, for then every one has the same. Obviously he should not depend upon the orchard alone. Many of these farmers have good natural hay land along the rivers and brooks and some of them have good land for grain and roots. In such cases the farms themselves indicate the kind of farming which should be adopted. Orcharding should not be the sole, perhaps not even the chief dependence in such cases. A system of diversified farming suitable to the farm and the tastes of the owner should be carried on. This might include dairying, beef raising, sheep raising, poultry keeping or the growing of vegetable garden crops and small fruits.

Notwithstanding the economic disadvantage under which the farmer labors in comparison with other producers who are generally well organized and have better command of the necessary capital to carry on their business, there are conspicuous examples of success of fruit growers in the Annapolis Valley who have combined orcharding with other lines of farming, such as dairying, for instance, as well as of those who have depended on orcharding chiefly. The truth of this statement is borne out by several articles which appear in the following pages written by those men themselves.

In many other sections of the Province the orchard fruits are grown with success, although nowhere on as large a scale as in the Annapolis Valley. In the counties of Lunenburg and Queens apple growing is a profitable side line on many farms. Bridgewater, New Germany and Caledonia are centres of important farming districts in which apples are produced for export. At each of these places a modern apple warehouse has been built which is owned and operated co-operatively by a company of leading farmers of the district. These places now have railway communication with the other parts of the Province and this branch of farming is therefore capable of much greater development. Apples of good quality can be grown here as easily as in the Annapolis Valley.

Parts of Digby and Yarmouth Counties are also good fruit growing districts. In Bear River and the vicinity in Digby County, and in Deerfield and Carleton in Yarmouth County not only the apple but the pear, plum, cherry and quince do well. Bear River is a noted cherry section, probably the best in the Province. Peaches are grown here and in Carleton, Yarmouth County.

In the Eastern part of the Province, Williamsdale and Pugwash in Cumberland County, New Annan in Colchester County, the West River district in Pictou County, Lochaber in Antigonish County, and portions of the southern part of the Island of Cape Breton, are adapted for apple growing. Most of these sections are also suitable for plum culture. Pugwash is a good cherry section.

Small fruits are grown without difficulty almost everywhere in the Province. The limit to their extensive culture is the lack of sufficient markets. Strawberries grown near the place of consumption are much superior in freshness to those brought from a distance. This fact together with the cost of transportation greatly favors the berries grown locally. More strawberries might profitably be grown for the local markets as well as for home use. If the present production were considerably increased there would probably still be sale at paying prices. Besides this, the number of families living on farms that are well supplied with this wholesome fruit is pitifully small. Much the same may be said of the bush fruits. They are easily grown wherever soil suitable for ordinary farm crops is found. They would furnish an acceptable addition to the daily diet. Yet very few tables are provided with these wholesome foods for even part of the year.

Gravenstein Apples in Bloom.

Picking Gravensteins at J. A. Kinsman's, Lakeville.

Yarmouth County because of its favorable soil and climate and accessibility to the Boston Market produces strawberries for export. In parts of the Annapolis Valley chiefly in Kings County, this fruit is grown and shipped in considerable quantities to Halifax, Sydney and St. John. Around Truro there are a few growers who find a ready sale for their product locally. Much more might be done in strawberry culture all over the Province.

THE PROPAGATION OF FRUIT PLANTS.

P. J. Shaw.

Propagation, in vegetable life, is the process of obtaining new plants from old ones, or of increasing the number of plants. Fruit plants are reproduced: 1. By means of seeds, or, 2. by dividing the plant into parts each of which may grow to form a new plant. The latter method is called Vegetative Reproduction as distinguished from propagation from seed where the element of sex enters into the process, giving it the name of Sexual Reproduction.

Plants grown from seed can be obtained more cheaply and in larger numbers than by the Vegetative process. They usually show more or less variation from the parent plant. This is an advantage when it is desired to obtain a new variety or to improve the original one. It is only necessary to watch for variations in the desired direction and select seed from plants showing the wished for characteristics. These characteristics, once obtained, can be reproduced in succeeding generations of fruit plants by the simple method of vegetative propagation. The nurseryman and the fruit grower, therefore, make frequent use of vegetative propagation to obtain the plants they desire. Vegetative Reproduction usually gives strong and full grown plants in shorter time than propagation by seeds.

The chief methods of vegetative propagation are 1. by division; 2. by layering; 3. by cuttings and 4. by grafting and budding. The fruit plants regularly propagated from seeds are chiefly the tree fruits. In this country these consist of the apple, pear, quince, plum and cherry. With these fruits this method, (the method of growing from seed) is practiced to get stocks on which later to bud or graft desirable varieties, which cannot be reproduced from seed. Until such trees are changed by budding or grafting to a recognized variety they are termed seedlings or natural fruit. All of the fruit plants can be, and are, propagated in this way from seeds. Plant breeders and those in search of new and improved varieties often grow the other kinds, such as the bush fruits, strawberries and cranberries, from seed. But these are usually propagated by nurserymen by one or other of the vegetative methods which are easier and quicker in results.

Seeds.

In growing fruit plants from seed the seeds may be sown as soon as ripe in a well prepared, sandy loam. The more common way is to stratify them, as it is called, as soon as they are ripe and sow them in well prepared soil the following spring. The method of stratifying consists in placing the seeds, thickly, in layers alternating with layers of sand. A layer of clean sharp sand an inch or so in depth is first placed in the bottom of a box, then a layer of seeds is spread thickly over this. Other layers of seeds and sand are added until the box is filled, the last layer being of sand. The box is then stored in a cool cellar where the proper conditions of temperature and moisture can be maintained or it may be buried two feet or so below the surface of a sandy, well drained piece of ground. It is desirable to sow or stratify the seeds of fruit trees and bushes as soon as possible after they ripen. If allowed to become dry they lose vitality and germinate feebly and unevenly, if at all.

The stratified seeds should be sown in well prepared soil as early in the spring as the ground can be worked. If not sown early, sprouts appear which are apt to be broken off in the process of sowing.

Seeds of the tree fruits, as apple, pear, plum and cherry, may be removed from the sand in the spring by putting it through a sieve fine enough to keep the seeds from passing through. Or the sand and seeds may be sown in drills together. The seeds can be sown more evenly if they are first separated from the sand.

Soil for seeds of fruit plants should be light, sandy and well drained. It should not be such as will bake easily or form a crust over the surface. Water should not stand on it in winter. It should be well supplied with humus to retain the moisture and well tilled through the growing season to keep the soil mellow.

One advantage of stratifying seeds is that it allows of spring sowing after the ground has been prepared following the winter season. The ground is then in a mellow state when the seeds come up and this condition can be maintained by the later tillage. There is danger of mice or other pests destroying the seeds if sown in the open ground as soon as ripe. These pests must also be guarded against when stratified seeds are stored in the cellar.

Division.

Propagation of fruit plants by division is done by breaking or cutting the original plant into two or more pieces having roots and tops attached to each piece. Each part becomes a new plant with exactly the same characteristics as the original. Examples of this kind of propagation are seen when currant or gooseberry bushes, having several stems coming from the root, forming clumps, are taken up and divided into two or more parts, each of which grows into a new plant. The separating of the suckers of red and yellow raspberries from the parent plants might be considered a form of propagation by division.

Cuttings.

Some fruit plants, such as gooseberry, currant and grape are regularly propagated by means of cuttings. The ripened wood of the last season's growth is cut in the fall or early winter from the bushes or vines which it is desired to propagate. This wood is cut into lengths of eight or ten inches with a bud near the base of each piece. The pieces, or cuttings as they are called, may then be planted in a well prepared bed of sandy loam and protected with a covering of straw or leaves and brush through the winter.

In nursery practice, however, they are more often tied into bundles of about twenty five each and buried in sand in a cool cellar or in a sandy piece of ground outside. In this temporary situation they are usually buried with the butt ends up, which are covered with two or three inches of sand. As soon as the ground can be worked in the spring they are planted in well prepared soil with the top bud or two above ground. The soil should be light, warm and well drained. It should be firmly packed around the base of the cuttings. A convenient distance to plant is in rows 14 to 18 inches apart and three or four inches apart in the row.

Cuttings of some plants, such as the black currant, may be successfully handled by taking them from the parent plant in the spring just before planting them out. But in almost every case it is considered better to give the cuttings a period of rest after their removal from the old plant. During this rest the cuttings heal over at the base, or form a callus, a change which usually precedes the formation of roots. It is with this end in view that nurserymen prefer to have the cuttings made some time before they are planted out.

Layering.

The branches of many fruit plants take root readily if they are in contact with the moist ground during the growing season. Advantage is taken of this fact by propagators by laying or bending down branches or shoots of such plants as gooseberry, currant, blackcap raspberry and grape, to induce them to take root. Later the rooted branch is cut from the parent plant and set out as a new plant. The process is called layering.

If the tips of the blackcap raspberry are brought into contack with moist, mellow soil during the latter part of summer they will take root. A bud or crown will form at the surface of the ground. If the rooted tip is cut off it forms a new plant which may be transplanted to its permanent position in the following spring.

Gooseberries will also take root at the tips of branches in the same way as blackcap raspberries. But they are usually layered by bringing the whole branch to the ground (sometimes pinning it down) and covering the part nearest the bush with a layer of moist soil from three to five inches deep. The tips of the branches continue to grow and later form the tops of the new plants.

Another method of treating gooseberries is that known as Mound layering. Plants having a number of young shoots or stems are selected for the purpose. Sometimes the tops are cut back heavily in the spring to induce the growth of a number of shoots or suckers. About mid season the the earth is raised, or mounded up about the base of the plants covering the lower part of the shoots to a depth of from 8 to 10 inches or more. These shoots or stems take root and early in the following spring are removed to form new plants. It sometimes requires two seasons to develop a good root system.

Grape vines are sometimes laid down in such a way that alternate sections, each about a foot in length, are covered with earth, the intervening portions remaining above ground. In a short time the covered parts take root. The whole vine is then cut into as many pieces as there were covered portions, each piece having a rooted part and a top. This is called Serpentine layering from the form which the vine takes in layering. It gives a larger number of new plants from an old one than the method of rooting only one plant to a stem but they are not as large nor as strong plants at first.

Grafting and Budding.

Other methods of propagation usually have for their object an increase in the number of plants. In grafting or budding, however, the chief aim is to perpetuate or increase a variety, not the species. The number of plants remains the same as at the beginning of the operation.

Grafting consists in taking a dormant shoot or twig, called the scion, from the tree or plant which it is desired to propagate, and inserting it, so that it will grow, into another tree or plant called the stock, which it is desired to change. Budding consists in inserting a bud from a tree or bush which it is desired to propagate, under the bark of the tree or bush which it is desired to change, so that the bud will grow.

The chief use of grafting and budding is to change an undesirable variety into the desired kind. Grafting and budding are also used to produce dwarf fruit trees. The former is used to bridge over wounds and diseased areas in the trunks of trees and for other purposes.

Fruit trees which come up from seeds in fence corners, by the roadside or in pastures and bear poor or worthless fruit may be grafted and thus made to produce the best varieties which will succeed in the locality. Fruit trees which have been planted in orchards and turned out to be the wrong or undesirable kind may be changed by grafting. In growing trees in a nursery for planting in an orchard the desired varieties are obtained by grafting or budding. In fact, since the tree fruits do not come true from seeds, grafting and budding are the only practical means of obtaining a named variety.

Kinds of Grafting.

The different methods of grafting are named according to the way in which the scion is joined to the stock. Those principally used in this country are cleft, whip and bark grafting, although there are many other methods. In cleft grafting the scion is cut wedge-shaped and fitted into a split or cleft made in the stock. In whip grafting both stock and scion are cut across obliquely, a cleft and tongue made in each and the tongue of one fitted into the cleft of the other In bark grafting the wedge-shaped scion is inserted between the bark and the wood of the stock.

Grafting is classified according to the part of the stock on which the operation is performed. Thus we have top grafting when the grafting is done in the tops of trees, stem or trunk grafting when it is done in the stems, crown grafting, in the crowns, and root grafting, when it is done on roots. Top and stem grafting may be done by the whip, cleft or bark graft method the choice depending on the size of the stock to be grafted. Crown and root grafting are usually done by the whip graft method.

Whip Grafting.

The method of whip grafting is adapted to stocks of from one fourth to one half inch in diameter, or the size of a lead pencil or the little finger. The stock is cut across obliquely with a knife at the point where it is to be grafted. Or it may first be cut off squarely and a cut surface made obliquely along the side for a distance of about an inch and a quarter below where it has been so cut off. This should be done by a clean straight cut leaving a plane surface. In small stems the cut usually extends to the heart of the stock or below. In larger stems it may not reach the heart.

Beginning near the upper end of the cut surface the stock is now split for a distance of about an inch or so, thus forming a cleft and a tongue. In the same way the lower end of the scion is prepared with a cleft and a tongue. The two prepared surfaces are now brought together, the tongue of one being pushed into the cleft of the other so that the cambium layer of the scion is in contact with that of the stock. In whip grafting the scion and stock are nearly of the same age. The barks of the two are about the same thickness. When the outer bark of one is even with the outer bark of the other, the inner barks and cambium layers are usually in contact. This is the condition necessary for growth and except in very rare cases, when the scion and the stock are of exactly the same diameter it can only be obtained on one side of the joint. The other side would therefore be uneven and the cambium layers not in contact. Usually the grafted joint should be wrapped with some kind of binding material. If it is to be in a position exposed to sun and wind from the start, as in the top grafting of trees where they stand, it should also be covered with grafting wax. On the other hand, under the conditions prevailing in this Province, when root grafting is done in late winter or early spring and the grafted roots are stored in a cool cellar several weeks before being planted out, the scion and stock will knit together and the wounds heal over without any waxing or wrapping. In planting the root grafts out the joint is buried several inches below the surface of the ground, the soil usually being moist at that depth until growth is well under way. The graft therefore does not dry out as it would under more adverse conditions as to moisture. The usual method, however, in whip grafting is to wrap the joints with some kind of binding material, such as waxed knitting cotton, waxed cheese cloth or factory cotton. This treatment serves the double purpose of drawing and holding the joint together and partially protecting the wounds from drying out. A ball of No. 18 knitting cotton dipped into hot, melted grafting wax and allowed to soak for about five minutes makes a very good wrapping material. Cheese cloth or cotton rags, dipped into the same kind of wax, or, better, having the wax spread on one side, are preferred by some. The waxed cloth is cut into strips half an inch in width and about four or five inches in length and wrapped tightly around the joint. If the temperature is fairly warm the cloth sticks tightly to the joint. About five or six turns of waxed knitting cotton are sufficient to protect the joint. This material is strong enough to hold the parts together and weak enough to be easily broken by a pull. The grafted roots are usually stored in slightly moist sawdust, moss or sand in a cool place until the time arrives for planting them out.

Cleft Grafting.

The method of cleft grafting is adapted to stocks of from three quarters of an inch to two and one half inches in diameter. In cleft grafting the stock is first sawed off squarely. The stub is then smoothed off with a knife and split sufficiently to admit the wedge-shaped scion. The scion is usually cut to a length of two or three buds. The lower end is shaved wedge-shaped, with the sides of the wedge about three quarters of an inch in length. In shaving the wedge it is usually made slightly thicker on one side than on the other, a bud being left at the top of this side of the wedge. Sometimes a bud is shaven through in preparing the wedge, the central part of the bud remaining on the thicker side of the wedge. In placing the scion in position this thicker side with the bud is placed on the outer side of the stock.

The scion is placed in the cleft so that the cambium layer of the scion is in contact with that of the stock. The cambium layer of each is marked by the line between the bark and the wood. The scion is pressed into the cleft until the wedge shaped portion is wholly or almost wholly contained in the cleft. Some grafters give the scion a slightly outward slope to ensure that the cambium layers cross or touch at some point. Usually two scions are set in one stock, especially if the stock is an inch or more in diameter. If both grow, the weaker one is cut out at the beginning of the next season.

All the wounds are then carefully covered with grafting wax. The usual method is to put a strip of wax down each side of the stub, covering the split in the stock. The upper ends of these two strips of wax are carefully wrapped around the scions just where they leave the stub. A cap of wax is then put on top of the stub to cover the wound and bind down the pieces of wax which were wrapped around the scion. Sometimes the tops of the scions are capped to prevent drying out, although this is not absolutely necessary.

Bark Grafting.

The method of bark grafting is adapted to large limbs and trunks from three inches in diameter upwards. The stock is sawed off squarely as in cleft grafting but not split. The scion is cut wedge-shaped but more is taken from one side than the other. The scion is inserted between the bark and the wood of the stock with the longer side or face towards the centre of the stock. A sharp pointed piece of steel, something like an awl, but of the size and shape of the wedge of the scion is pushed down between the bark and the wood of the stock lifting the bark for the scion. The scion is then inserted in the opening made between the bark and the wood. Usually several scions are placed in one stub, the number depending on the size of that stub. Some of the largest may have six, eight or ten scions. The weakest of these are gradually cut out, finally leaving only one to form the new top. The top of the stub is waxed as in the case of cleft grafting, but there are no splits down the sides needing attention.

Top Grafting of Fruit Trees.

The question often arises whether or not to top graft fruit trees. It is a question which should be settled by the particular circumstances of the case. In general it may be said that it is unwise to attempt to change fruit trees of recognized varieties on the market after they have reached the bearing age. As long as the fruit will sell at some price it would be more profitable to give the trees the best possible care, inducing them to bear as large crops of good fruit as they will, to be disposed of for what it will bring.

If other varieties are wanted it would be better under such circumstances to plant young trees of the desired varieties and to give these good care, bringing them into bearing as early as possible. Sometimes a top grafted tree begins to bear fruit the third year after it has been grafted. Often it bears little or no fruit for a period of four or five years. In that time the young trees which might have been planted would have been well on the way to bearing. In the meantime the owner has lost several good crops from his older tree in the attempt to change it to a different variety. He may even have lost more in the possible injury through checking its growth.

If the tree is a seedling or a poor variety for which there is no sale, nothing would be lost by top grafting it while much might be gained. What was before an encumbrance on the ground might become a source of revenue to the owner.

Young trees which have been planted in the orchard for a period of four or five years or less may be top grafted with much less risk of injury through checking their growth than is the case with older trees, and with little or no delay in the bearing of fruit. If trees are to be top grafted the sooner it is done after the first year they are planted in the orchard the better. Some persons even top graft the same season the tree is planted but generally it is better to let it first become established and make some growth of top.

In the top grafting of bearing trees the most vigorous limbs should be selected for grafting. Those in the centre of the top and highest up should be among the first to be grafted. These are usually the strongest growing branches and are not in a position to be shaded or starved by the remaining branches. If grafted first, they do not fall on, and break off the scions in the lower limbs as they otherwise might. If weak, lower limbs are grafted a year or two before the top branches, or if not enough of the top is removed at the time of grafting, the scions make feeble growth even if they "take" at all and are likely eventually to fail.

The distance from the trunk for sawing off the limbs should be such as will afford a sufficient width to the new top. Grafts set in old trees tend to grow upright. On the other hand the scions should not, of course, be set so far out on the branches that sufficient room will not be left for new growth. The limbs for grafting should be selected and cut at such distances as to form a symmetrical new head. A small side branch should be left a short way below each stub to furnish foliage for the limb in case the scions should fail.

In top grafting a tree of bearing age it is usual to take three years in which to complete the operation. That is, one half of the top is grafted the first year, nearly all the remainder the second year, the grafting being completed in the third year. The limbs grafted each year should be fairly evenly distributed over the top. The suckers, which are likely to arise in abundance, especially about the grafted stubs, should be cut off. When the grafting is completed the third year there will be many suckers and superfluous limbs to remove.

With vigorous trees on good soil this method of changing the top by degrees is safer than to take off the whole top at one time. The latter method might seriously check the tree in its growth and possibly result in its death. On the other hand, if the trees are making a rather feeble growth, especially if they are on poor, light soil, very little if any danger is incurred in grafting the whole top in one year. Of course, a few minor branches should be left to produce foliage for a time and later to be cut off. Under such conditions the grafting of the whole top in one year may be advisable. It may stimulate a growth in the scions which otherwise would be feeble and unsatisfactory.

Top grafting of trees in their permanent positions is done in the spring, usually in the months of April and May. Cherries should be grafted in April or May although some prefer the earlier month, apples and pears at any time that the weather is fit from the first of April until the first of June, provided the scions are dormant.

Some prefer to graft these fruits about the latter part of April or the first part of May which is probably the best time. The buds on the fruit trees are then either dormant or just starting into growth and the scion has the full season for growth. Others think it better to do the work when the leaves on the fruit trees are the size of a mouse's ear. In any case it is important that the weather should be fine and warm. A pleasant day contributes materially to the success of the operation. The work can be done more thoroughly on such a day not only because the operator is comfortable but because the wax is more likely to adhere properly.

The limbs should be sawed off where they are free from knots so as to have stubs with a straight grain and easy to split. To prevent stripping of the bark from the stub a cut should first be made with the saw on the under side of the limb which is then cut off from above. Or the limb may be first cut off a foot or so beyond where the grafting is to be done leaving a stub to be sawed off afterwards. Stubs lying in a horizontal position should be split horizontally. If a vertical split is made, one scion will be situated under the other and as the new growth is usually in an upright direction the lower graft grows into and interferes with the upper.

Scions.

Scions may be cut at any time during the dormant season, that is, from the time the leaves fall in the autumn until the buds begin to start in the spring. Some nurserymen like to cut them in March before there is any sign of activity in the tree. If they are cut very long before they are used, they should be packed in slightly moist sawdust, moss or sand and stored in a cool cellar where they will not dry out or start into growth. If the frost is out when they are cut, they may be buried two feet deep in the ground where they will remain dormant until taken up for use. If the scions have been cut very long before they are used, an inch or two of the lower cut end should be discarded in grafting. It is apt to be too dry. Similarly, an inch or two of the top should be thrown away if the wood is soft and pithy and the buds not well matured.

Grafting Wax.

All wounds made in grafting should be carefully protected from the sun and air as soon as possible after they are made. Different substances have been used for this purpose. Clay was once in common use, being bound on the cut surface by means of cotton cloth or rags. A mixture of clay, cow manure and hair is sometimes used. But the most common material used and the most convenient is what is known as grafting wax, a substance made of resin and beeswax with the addition of either tallow, raw linseed oil or wood alcohol. Each kind of wax has its special advantages for certain conditions of temperature or method of grafting.

The grafting wax most frequently used is made by the following formula:

4 parts by weight resin.
2 parts by weight beeswax.
1 part by weight tallow.

The ingredients are melted in a pot or kettle over a moderate fire so as not to cause violent boiling and stirred until they are thoroughly mixed. The mixture is then poured into cold water and pulled in much the same way as molasses candy. The hands should be well greased during this operation to facilitate handling of the wax.

This makes a hard wax suitable for applying cold with the hands during warm weather. It can also be put on warm with a ladle. A cheaper wax and one preferred by some for use while warm is made as follows:

5 lbs. resin.
2 lbs. beeswax.
1 pint raw linseed oil.

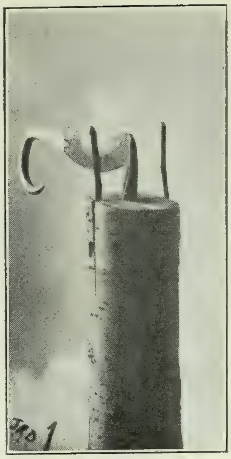
Melt the ingredients as in the former case and use the wax warm. It is not necessary to pour it into water and pull.

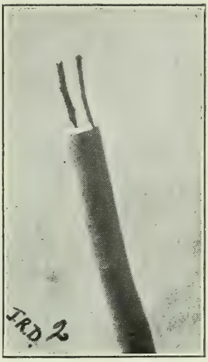
Budding.

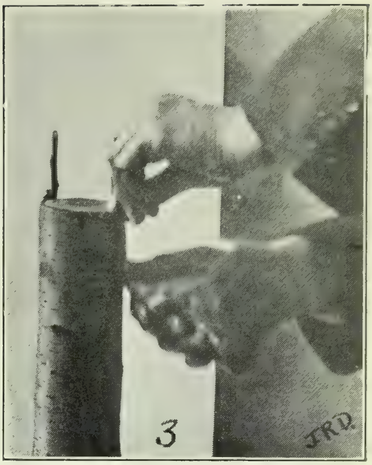
The budding of fruit trees is done in the month of August or the first few days of September or as late as the bark will slip or lift and after the buds on the present season's growth have developed sufficiently to be used. A stem or shoot of the diameter of a lead pencil or the little finger, called the stock, is selected for the operation and a T-shaped cut made through the bark where the bud is to be set.

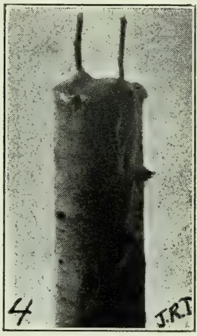
A twig of the present season's growth is cut from the tree of the variety to be propagated. The leaf blades are immediately cut from this twig, leaving about half an inch of each leaf stalk or petiole still attached to the twig. This twig is called a bud stick. The buds are removed from the bud stick as they are wanted by cutting through and removing the bark of the twig for a distance of a quarter of an inch or so above and below the bud. In this operation, a small piece of wood just under the bud is usually removed from the twig along with the bark and the bud. The petiole, the bark, the bud and this piece of wood constitute what is known as the bud. In special cases where great care is being taken to make each bud succeed the bit of wood is removed from the bud. But generally it is not considered of sufficient importance to take the trouble to remove it.

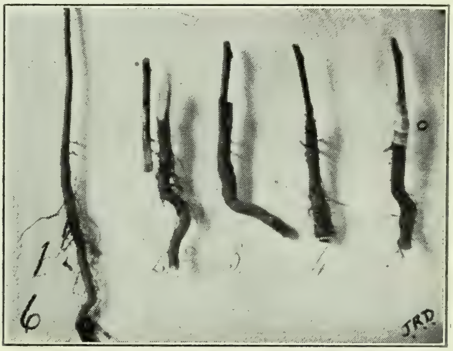
The corners of the bark where the T-shaped cut has been made in the stock are now lifted with the point of the budding knife or with a special attachment on the end of the handle for this purpose. The bud is taken by the petiole and pressed or slipped down between the bark and the wood until it is completely in touch with the growing tissue. The bark of the stock is now bound down with several strands of raffia or other soft tying material to keep the bud in close touch with the growing tissue underneath. At the end of ten days or two weeks if the bud is going to grow it will have knit to the wood of the stock, or "taken", and the petiole will drop off on being pressed with the finger. The

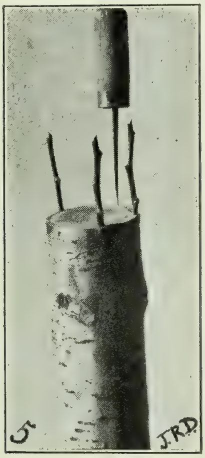


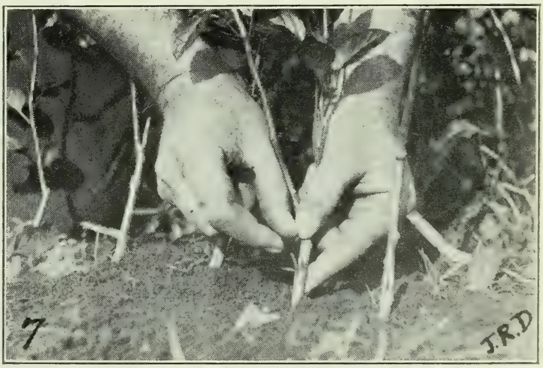












1. Grafting Iron and Scions in Place. 2. Grafted Stub Ready to Wax. 3. Applying the Wax. 4. Grafted Stub Waxed. 5. Bark Grafting With the Scions Set. 6.—1. Young Seedling.—2. Scion and Root prepared.—3. Root and Scion United.—4. Bound With Waxed Cheese Cloth. 7. Budding. Placing the Bud in the T-shaped Cut.

tying material is then cut to allow of the expansion of the stock.

In the spring following the budding, and before growth has begun if the bud has survived the winter, the top of the stem or shoot is cut off just above where the bud was set. The bud produces a new growth of top of the same variety as that from which it was obtained.

Budding is used in nursery work to produce the variety of fruits desired. With apples, pears, plums and cherries one-year old stocks are cut back to 8 inches or one foot in height and planted in nursery rows in the spring. In August of the same year they are budded within an inch of the ground usually on the north side of the trunk. At the end of the next season they become one-year old whips with the three-year old roots. At the end of the second year they are two-year old trees with branches on four-year old roots.

In root grafted trees of the same age of tops the roots are one year younger than those of the corresponding age of tops of the budded trees. The budded trees have the whole root system, undisturbed, to push them and hence make more growth in the first few years than the root grafted trees.

GROWING NURSERY STOCK.

By Henry P. Banks, Waterville, N. S.

Under some conditions it is advisable for an orchardist to grow trees for his own plantation. If the land for the orchard requires time for preparation, the nursery stock may be grown meantime. The grower will have the opportunity of selecting his scions from trees of high individual merit, and will know that he is getting trees that are true to name. On the other hand it requires knowledge and experience to grow good trees, and the average man is often tempted to set trees that should go to the brush pile. As a rule, the nurserymen can grow trees more cheaply than the amateur.

The common practice of nurserymen is to buy seedlings from men who make a business of growing them from the seed. The seeds are obtained by washing from pomace. Apple seedlings require a deep, mellow soil and intense cultivation and fertilization, in order to attain the desired size in one season. The seedlings should be at least three-sixteenths of an inch in diameter at the crown. One year old seedlings are better than older ones, as they are more easily grafted. Whip grafting is preferred to budding by those who are not specialists in this work, as less experience is necessary and it may be done at a more convenient season. A root about three inches in length and a scion having two buds make a satisfactory graft. Many nurserymen use No. 18 knitting cotton for tying. The writer prefers strips of waxed cloth. The twine is quite satisfactory if the grafts are properly cared for, but the waxed cloth gives protection against slight errors in treatment. It is not advisable to use the lateral roots in grafting, as they have a tendency to form roots on one side only. For the same reason the lower part of the root should be cut off squarely. Root grafting is usually done in February or March. The grafts may then be packed in damp sawdust and stored in a cool place until the soil is ready for them in the spring.

Next in order is the preparation of the soil. Select a well drained, medium to heavy loam that has had a heavy application of manure and a hoed crop the previous season. Apply more manure and plow deeply in the fall. These directions are important, as humus is consumed very rapidly by the intense cultivation, and spring ploughing will loosen the soil too deeply for the best results in the dry season. Apply 500 pounds of basic slag per acre in the spring, and prepare the soil well with harrows.

The grafts should be set with the top bud just above ground, ten to twelve inches apart in the row, and the rows three to three and a half feet apart. About 14,500 grafts are required to set an acre in this way. If possible, run the rows parallel to the direction of the prevailing winds. To set the grafts, open a furrow with the plow, going about to each furrow to make it straight and uniform in depth. Set the graft by hand, and press the soil very firmly around the roots. The remainder of the furrow may be filled in with a hoe. Do not expose the union of the graft to the sun or frost. Cultivate once a week and hoe often to keep the weeds killed. Do not cultivate after the first of August, as there is danger of stimulating a late, tender growth. This rule will apply for each succeeding year.

A light sprinkling of nitrate of soda, applied soon after the grafts are set, in addition to the fertilizers applied when the soil is prepared, will usually be sufficient for the first season. A good mixture for the second and third seasons is 1,000 pounds acid phosphate, 200 pounds muriate of potash, and 200 to 300 pounds nitrate of soda per acre. Never apply more than 100 pounds nitrate per acre at once. Acid phosphate is preferred to bone meal or basic slag because its phosphates are soluble and mix readily with the soil, and it is not so disagreeable to sow by hand.

All the pruning required the first season is to break off all suckers from the root, and take off all but the strongest shoot from the scion. The next spring cut the top back to a strong bud on the windward side, and remove two or three buds below it. This is best done when buds have just burst, as the vigor of the buds is readily seen and bud worms can be detected and destroyed. These little pests often destroy the bud left to form the central leader. In midsummer run over the trees again, and cut back any laterals that are robbing the leader, and remove any shoots that are less than one foot from the ground. An ideal tree has a well balanced root system. It is vigorous and stocky, and has a low, well balanced top, with straight central leader. Trees of this type are well adapted to any height desired.

An inexperienced man should not attempt to grow tender or wayward varieties. Failure is nearly always caused by neglect, and neglect will always cause failure.

PLANTING AN ORCHARD.

P. J. Shaw.

An Orchard is usually a long time investment. It may be fifteen or twenty years before it comes into full bearing and fifteen or twenty years more before it reaches its best. Mistakes made at the beginning often bring more loss to the owner than the mere cost of the trees or the cost of planting. Wrong location or inferior trees may mean failure of the orchard after years of labor and expense. It pays therefore to give careful consideration to a few essential features of orchard practice before planting the orchard.

The Soil.

Any deep and well drained soil which is good for ordinary farm crops is suitable for an orchard. In this Province apples are successfully grown on nearly all kinds of soil from light sand to heavy clay. Sandy soils are usually poor in plant food and deficient in humus. But when these materials are supplied either by the application of barnyard manure or fertilizers and green crops, these soils become good for orchard purposes. They are early, easily worked and quickly respond to good treatment. They are usually well drained naturally and can be driven over with the spray rig or other implements in the early spring when heavier soils are too soft.

Clay soils are richer in plant food and are more retentive of moisture and of the fertilizing materials which are applied to them. They are not as early, or as easily worked as sandy soils. They must contain just the right degree of moisture when handled, being neither too wet nor too dry, while sandy soils may be tilled at any time when they are not frozen or covered with snow.

A loam, whether sandy or clayey, combines the good features of both these soils. It is on some kind of loam that most of the orchards of Nova Scotia are planted. But whatever the nature of the soil, whether sand, clay or loam, it is essential that it be of sufficient depth and have good drainage.

A shallow soil, that is one having rock, hard pan or an impervious subsoil near the surface, or a poorly drained soil is unsuited for orchard purposes. Fruit trees planted on such a soil will soon become sickly and stunted and will be short-lived. Natural drainage through an open porous subsoil is generally best. But if for any reason trees must be planted on land which is not naturally well drained it should be underdrained. The good results obtained from a gravelly or stony loam are probably as much due to the greater depth and superior natural drainage in such soils as to any other cause. Many fruit growers consider these the best soils for apples. Cherries, likewise, do well on gravelly loams while pears and Domestica plums prefer a heavier soil.

The Site.

The orchard site should be somewhat higher than the adjoining land. The best sections of fruit areas are usually on elevations 50 to 100 feet above the rivers or lowest levels On such elevations the soil is deeper and the drainage better.

Not only is there less danger from injury to blossoms by frost but the temperature during cool periods of the growing season is likely to be higher. The warm air of the lower levels rises or is pushed up to the higher elevations by the colder, heavier air as it settles down. In this way it seems probable that the selection of a proper site for an orchard may have as much to do with its success as the proper soil.

The Slope.

Although orchards are successfully grown on lands having different slopes, there are definite advantages connected with certain slopes. A northerly slope, for example, being cooler, may delay the blossoming period until the danger of late spring frosts is past. An easterly slope offers less exposure to prevailing winds. Hence there may be less injury to trees and crops from wind and less loss of moisture from the soil in the growing season. A southerly slope affords more sun and heat and may result in earlier, better matured and more highly colored fruit.

In the United States it is claimed that certain adaptations of varieties of apples to soils have been discovered. For instance, the Baldwin, it is said, does best on medium to semi-light soils, or on the medium light loams, or on the heavy sandy and the medium sandy loams. The King, to obtain its best color and quality, it is claimed, should be planted on light, mellow loam, the sand of which is medium rather than fine. To obtain good color and avoid greasy skin in the Spy the soil should be moderately heavy or a medium loam underlain by a heavy loam or light clay loam. The Wagener, on account of the feeble growth of the tree, requires a deep rich loam. It should not be planted where there is a stiff subsoil or on a thin hill.

Many readers no doubt can readily think of exceptions to these rules, where well colored Spys, for instance, grow on heavy clay soil and good Wagener orchards on light soils. Whatever the value of these recommendations may be, it can readily be seen that a certain exposure, or slope, might largely counteract the natural effect of the peculiar character of the soil. The Spy, for instance, grown on heavy clay on a decidedly southern slope, as at the foot of the North Mountain, might receive heat and sun enough to develop excellent color. The Wagener on a thin, sandy soil with a northerly slope, the land being well fertilized, might give satisfactory crops. In a similar way the character of the site whether high or low or the nearness to salt water might have as much to do with the success of the trees or of the different varieties as the kind of soil, whether medium, light or heavy. The point is that the influence of the soil should not be considered separate and apart from that of the site and the slope of the orchard. These factors are closely related in their ultimate effects.

Preparation of the Soil.

Sometimes orchards are planted on land which has received little or no previous preparation in the way of fertilization or tillage. If the soil is naturally fertile and well suited to the growth of fruit trees such orchards may do well, especially if they receive good after care. Often, however, on ordinary or rather poor soil the trees make little growth for the first few years, until the land has been brought into better condition. In the meantime they have received a check from which they may be slow to recover. The best practice consists in thoroughly preparing the ground before the trees are planted. If the whole area cannot thus be prepared strips five or six feet wide and the right distance apart may be made ready and a row of trees planted on each strip. The land should be in good tilth at the time of planting. That is, it should have been worked until it is fine, loose and mellow and well aerated to a depth of eight or ten inches. It should be well supplied with humus in the form of barnyard manure, rotted sod or green crop plowed under. For the best results, it is often necessary to begin the preparation of the soil a season ahead. Either grow a preparatory crop, such as a root crop to which has been applied a liberal quantity of barnyard manure or grow a cover crop of vetch or buckwheat to be plowed under. The land should be plowed deeply in the fall, if possible, and left with a rough surface exposed through the winter.

How to Get Trees.

A person may grow his own trees, buy them from a local nursery or import them from nurseries at a distance. Some profitable orchards in Nova Scotia have been grown from seed by the owners. In a few cases seeds were sown in the orchard where the trees were to grow. In other cases they were sown in a nursery row and the seedling trees moved to the orchard when two or three years old and top grafted to the desired varieties. In still other cases orchardists have planted root grafts from which they have grown their own nursery stock. To save time, however, and avoid the trouble of growing young trees it is better to buy them from some one who makes this work his business. It requires special knowledge, skill and close attention to grow good trees in a nursery. In many cases the trees will be cheaper and better grown by the nurseryman than by the farmer or orchardist.

Trees from a local nursery, provided they are well grown, are to be preferred to imported ones. The purchaser has the advantage of being able to inspect the stock before buying, gets the trees with the minimum amount of exposure of roots to the air, and is less likely to bring into his orchard new insect pests and plant diseases. Imported trees often come long distances and may be a long time on the way. On arrival in this Province the inspection for plant diseases and insect pests results in further delay and drying out, so that they have not the same chance to succeed as the home grown trees.

Where it is not convenient to get trees from a local nursery they should be ordered direct from a trustworthy nursery firm, not through a travelling agent. Trees bought from an agent usually cost double what they do when bought direct from the nursery. Usually there is not the same guarantee of good stock that there is in dealing with a firm of established reputation. The best apple trees should not cost more than 20 to 25 cents apiece, pears, plums and sour cherries, 25 to 30 cents. To ensure getting good stock and the varieties desired, the order should be given some months before the trees are to be delivered, the previous season if possible. One or two year old budded trees, or two or three year old root grafted trees are generally to be preferred to older ones. Most of the Nova Scotia orchards were planted with two or three year old trees.

The advantage of a one year old tree or whip as it is called is that it allows the orchardist to train the tree from the beginning according to his preference. If he wishes a low headed tree it is more easily obtained from a one year old whip than from an older tree which has been trimmed up in the nursery. One year old trees are more easily shipped, handled and planted since they are smaller and have smaller root systems. One is likely to get better trees from the nursery when he takes one year old trees. The nurseryman naturally picks out the largest trees to dispose of first. The three year old nursery trees are usually the ones which have grown the slowest—the titmen in hog language.

On the other hand one year old trees set in the orchard need a soil in better condition and need better care than older trees, just as the nursery trees require better care than orchard trees. Unless a person can give his trees good attention he had better choose two year old budded or three year old root grafted nursery stock.

The best time to plant trees in this country is probably in the spring. At least that is now the general practice of fruit growers in this country after years of experience. But the best time to dig them may be in the autumn if it is done after the leaves have fallen. They should then be heeled in in a convenient place until spring. Autumn digging of trees allows the root ends to heal over before the trees are planted out in the spring. If the main roots are cut back to their proper lengths when the trees are dug a callus. will have formed over the ends by the time the trees are to be set out in the spring.

Time to Plant.

The sooner fruit trees are planted in the spring, after the ground is fit to work, the better. This is especially true of plums and cherries. The latter start into growth very early and if transplanting is delayed until the latter part of May or first of June most of the trees are apt to die. Early planting allows the new roots to form before the buds leaf out. When the leaves appear later the root system has developed sufficiently to be able to supply the tree with moisture as it is lost by evaporation through the leaves. In some countries fall planting is considered better than spring planting. But those countries are generally further south and have less trying winters than ours.

Care of Trees Before Planting.

As soon as the nursery stock is received it should be unpacked, the bundles opened and the trees heeled in near where they are to be set. Here they may remain until everything is in readiness for planting. If the trees are very dry on arrival they should be put into water for a short time to cover the roots and part way up the trunk. Or the whole tree may be buried in moist earth for a time until it recovers from its shrivelled condition. "Heeling in" is done by setting the trees close together in a trench about a foot or foot and a half deep, the tops tipped to one side and the roots covered with fine moist soil, firmly tramped down. In this situation they keep moist until they are planted. When taken from this trench for planting the roots should be kept covered with damp burlap or other material until covered with earth in their permanent position. Some planters first heel in the trees singly, each near the position where it is to be planted. There is then little exposure of roots to the air in the final planting.

Distance Apart to Plant.

The distance apart to set trees depends on the size to which they grow. If unrestrained, the size depends on the kind of tree and the condition of the soil and the climate in which it is grown. In any case, fruit trees should be set so far apart that the branches of one tree will not interlace with those of another, or they should be prevented from interlacing by repressive pruning, or heading in. Otherwise the forest condition is reproduced: a canopy overhead, weak and dying branches below, the bearing surface reduced to a minimum and raised aloft on long bare trunks and branches.

The usual distance apart for planting standard apple trees in this Province is from 30 to 40 feet. Large growing varieties like Baldwin and Northern Spy on rich ground should be forty feet apart, while smaller growing varieties like Wagener, Wealthy and Duchess may be as close as thirty feet or even closer. Pear trees may be twenty to thirty feet apart, plum and cherry trees fifteen to twenty. Sometimes plums are planted as closely as ten feet by fifteen. The distances given for apples are for trees which are allowed to reach their natural size. When a system of repressive pruning is followed they should be set at least one third nearer. From a rod to twenty feet is a favorite distance with some planters. Apples on Doucin stock, that is semi-dwarf trees, are sometimes planted in rows thirty feet apart with the trees eight to ten feet apart in the row.

In a young orchard with the trees set thirty to forty feet apart each way there is much space not utilized by the trees. Where orcharding is carried on in conjunction with, or as a side line to, other farming this space may be employed for a time, without detriment to the orchard, in the growing of certain farm crops. Sometimes, however, the owner of the orchard wishes to grow only tree fruits. He wishes also to get the maximum yield of fruit per acre and at as early a date as possible. This is accomplished either by the use of what are called "fillers" or by the close planting and repressive pruning of the standard fruit trees. By the term filler in orchard practice is meant a small growing short-lived fruit tree coming into bearing at an early age which is planted between the permanent trees of an orchard to be removed when the space is needed by these trees. It may be of the same species as the permanent or standard trees as when apples are interplanted with apples, or a different species as when plums or cherries are used with apples. The trees used as fillers should give profitable returns before the time comes for their removal. They are sometimes planted in the rows of permanent trees, one filler between each two standards and of the same number as the standards. At other times they are planted between the rows of standards as well as in the rows when there may be three times as many fillers as standards. The danger is in getting so many trees per acre that the needs of the trees outrun the owner's resources in fertilizers. The results may then be that the trees have to be removed before they have produced enough fruit to pay for the extra expense. Examples of apples used as standards are Gravenstein, Blenheim, King, Baldwin, Spy and Golden Russet; of apples used as fillers, Duchess, Wealthy, Wagener and sometimes Stark and Ben Davis. Plums and cherries of any varieties may be used as fillers with apples.

Laying Out the Orchard.

The trees may be planted in squares or rectangles. In the quincunx system, a fifth tree is planted in the centre of each square or rectangle. The trees are now in triangles. If the triangles are equilateral, the system is hexagonal. The hexagonal method of planting economizes space to better advantage than any other. Each tree is the same distance from all adjacent trees.

Many different methods have been described for laying out a fruit plantation. Some of these depend upon the use of a corn marker or plow, some upon garden lines or wires and others upon sighting to get the rows straight. Some are better adapted to small areas than large ones, and others to level fields rather than uneven ones. A method which has been found useful in the planting of small areas of from two to four acres is as follows: Place one row of stakes along one edge of the boundary. These stakes, which are to mark the ends of rows of trees, should be the same distance apart as the rows, and set outside the space where the trees are to be planted. At one end of this row of stakes and at right angles to it, a second row of stakes is set out to mark the ends of rows in the other direction. Similarly rows of stakes are set on the third and fourth sides of the plantation. The position for each tree is now found by sighting from these stakes across the field in two directions. A stake is placed where each tree is to go. A planting board is used to find the exact position of this stake after the hole is dug. This consists of a board five or six feet long and about six inches wide, with 1½-inch augur holes through it near each end, and a notch in one side exactly half way between the two holes, and large enough to admit the trunk of a young tree. The planting board is placed on the ground with the stake in the notch. A small pin about a foot in length and one inch or less in diameter is pushed into the ground through the hole at each end of the board. The board is then lifted from the stake and the pins, the stake is removed and the hole for the tree dug. When the board is placed back upon the pins, and the trunk of the tree brought into the notch of the board, the tree will be where the stake stood before.

Where large areas are planted, the ground is laid off with a pair of horses and a plow. Shallow furrows are first plowed to mark the rows in one direction, then deeper furrows at right angles to mark the rows in the other direction. At each intersection of the furrows a tree is set. The filling in around the trees is done partly with a shovel and partly by plowing back the furrows previously plowed out.

H. E. Van Deman describes a method of laying out an orchard in the hexagonal style as follows: "For small orchards of an acre or two, I have often practised a method of laying out in the hexagonal style which is very quickly and easily done. As many stakes are provided as there are trees to be set. A wire is prepared of the exact length that the trees are to be apart, and a ring or loop twisted in at each end, by which to hold it. A base line is established by setting stakes just where each tree will be in the first row. One person (A) slips a finger through one ring, and another (B) takes the other end of the wire and runs a small stick through the ring. A holds his end exactly at stake 1, and B steps to where he supposes the first tree of the second row will come, and with the point of his stick marks a small arc of a circle on the ground. He remains there while A goes to stake 2 and holds his end exactly to it. B describes another arc on the ground and where it crosses the first one he sets a stake, and moves to the place for the next stake. There he makes a mark, and A then goes to stake 3 of the base line and holds the wire as before, while B finds the crossing of the marks and sets another stake; and so on to the end of the row. When the second row is complete it is used as a base line from which to make a third, etc., etc. If the work is done carefully, the stakes will be found to be in very straight rows every way. I have tried it on some of the roughest hills in Northern Michigan, where, in newly-cleared places, the stumps were very thick, and planted nice orchards, that are now over twenty five years old, that look today as if the trees had been set by a compass and chain. On level ground, free from obstructions, it is fun to lay out an orchard so."

Planting the Trees.

Before planting the trees in the spring the ground should be well harrowed or plowed and harrowed until level. The hole for the tree should be dug somewhat larger than is required to admit the root system, especially in ground in-

inclined to be hard. In digging, the top soil and the subsoil should be kept separate. In replacing this material a shovelful or two of top soil or of any good soil is first put into the hole the tree placed in position and the remaining top soil or good soil is worked in around the roots. The subsoil is placed on top. The earth should be well worked in around the roots, by hand if necessary, and when the hole is nearly full it should be well tramped down. A layer of loose earth should be left on top, to act as a mulch. If manure is applied at the time of planting, it should not come into contact with the roots. It may be spread on the surface when the hole is nearly filled, and covered with loose earth. Some planters set the trees about one inch deeper than they stood in the nursery, to allow for the settling of the freshly plowed land. Others plant them at the same depth as before.

The depth to plant sometimes depends on the drainage of the land. Trees may be planted deeper in well drained land than in wet land. Of course, it is better not to plant on wet land but if for any reason trees must be planted on such land they had better be planted shallow, nearly on top of the ground and the earth ridged up towards them.

As soon as the trees are set, the whole land should be given a thorough cultivation, either by harrowing or by both plowing and harrowing. This cultivation with the harrow should be continued once every week or ten days, and after every rain, until the first of July, when a cover crop should be sown to occupy the ground the remainder of the season.

The Initial Pruning.

The kind and the amount of pruning to be given a tree at the time of planting in an orchard depends on the age and size of the tree and the ideals of the grower. In any case there should be a considerable reduction of the top to correspond with the loss of roots incident to the transplanting. If the tree is two or three years old, and has the head already formed at the height which suits the orchardist, the pruning will consist chiefly in removing all the branches except three, or four, or five which are to form the framework of the top. These should generally be shortened to about one half or one third their length. No two limbs should arise from the trunk at the same elevation, otherwise a weak crotch is apt to be formed. The main branches should be so distributed as to form a symmetrical and well balanced top. If the tree is younger or smaller, the pruning may merely consist in cutting back the main stem to the height at which it is desired to have the head. The framework of the top may then be formed from the new branches which arise. Some prefer to do the pruning before the tree is set out. Others prefer to do it after it is in its permanent position.

The only pruning of the roots necessary is to cut off any broken, bruised, or injured parts, and to shorten any main roots which may happen to be longer than the general root system. Some authorities recommend shortening all the main roots to within three or four inches of the trunk.

THE CARE OF THE YOUNG ORCHARD.

P. J. Shaw.

The care which the young orchard receives will largely determine the health of the trees and the character of their growth. It will also have some effect on the number of trees that succeed after the transplanting and on the time which it takes for the orchard to come into bearing. Quite a difference can be made in the orchard in these respects by the attention given to cultivation, fertilizing, pruning and spraying.

Cultivation.

For the first few years after the planting of the trees, the plowing should be rather deep to loosen the under soil and to make the main roots develop below the reach of the plow in later cultivations. The young orchard should be tilled regularly every year. The ground should be plowed either late in the fall or as early in the spring as it can be worked. If the soil is light and sandy it may be worked up with a heavy harrow, such as the disc, in the spring. If the land is to be wholly devoted to trees from the start it should be harrowed after this once a week, or every ten days, or often enough in any case to prevent the formation of a crust. The heavy harrow should be used early in the season and the lighter one later when the soil becomes finer. In the early part of July a cover crop should be sown to occupy the ground until the end of the season. The object of this cultivation is not primarily to kill weeds, but to conserve moisture, to improve the tilth and to make the fertilizing materials in the soil more available to the trees. It should begin early in the season before there has been much loss of moisture through evaporation and be repeated as often as a crust begins to form. It should cease by the first part of July, thus removing the stimulus to growth, and enabling the tree to ripen its wood for winter.

Sometimes the method of sod culture is suçcessfully practised with apple orchards. Briefly, this consists in seeding the ground to grass, mowing the crop two or three times during the season, and either leaving it where it falls or placing it as a mulch around the trunks of the trees. This system is, no doubt, suited to certain soil conditions, as where there is a good depth of soil, abundant richness and moisture. It is especially adapted to orchards on steep hillsides where cultivation is difficult and the soil is apt to wash. It is mostly practised with bearing orchards, however, and not often recommended for young trees.

Cropping the Young Orchard.

While the orchard is young a considerable space is unoccupied by trees and this may often be profitably devoted to farm or garden crops, then called intercrops, provided the fertility of the soil is maintained. If the proper crops are selected for intercrops and given the full amount of tillage which they require the orchard may do much better than if it had not been cropped. Besides, the land brings in a revenue while the trees are growing to a bearing age. The length of time during which the ground may profitably be cropped depends on the distance apart that the trees are planted and the rate at which they grow. In the most closely planted orchards it may not be advisable to crop the land more than two or three years. The ground soon becomes partly shaded, giving smaller yields of the intercrop while the presence of the crop interferes with the economical tillage of the orchard and the care of the trees.. Where the trees are set 30 to 40 feet apart with no fillers between, the cropping may continue for ten or fifteen years or until the orchard comes into bearing. It then requires regular spraying and the presence of a crop interferes with this and other operations.

If the orchard is planted with a hoed crop the tillage of this will suffice for the trees. Such crops as potatoes, corn, beans and other vegetables are good to grow in young orchards, especially if they are well tilled and fertilized. In general, an annual crop is to be preferred to one occupying the ground for more than one season since this ensures the plowing of the land every year. But strawberries and bush fruits are satisfactory crops for young orchards if they are kept far enough from the trees or if the trees receive proper

Two Examples of Strawberries Grown in Young Orchards.

cultivation. It is well to keep the nearest rows of these small fruits five or six feet from the rows of trees, or if the trees are very young and strawberries are grown close to the tree rows the trees may be hoed a few times during the season in which the strawberries are in fruit. This conserves the moisture in the soil and prevents any check in the growth of the trees. If a strip of ground along the row of trees is left uncropped it should be thoroughly cultivated throughout the growing season until the first of July.

If a strip of ground eight or ten feet wide is given up to each row of trees from the beginning, and kept cultivated, the remainder of the land might be used for ordinary farm crops without detriment to the young orchard. The usual rotation of farm crops, including grass, grain and hoed crops might be followed here. But the cultivated tree strips should be gradually widened, until, when the orchard is eight or ten years old, the whole land will receive annual cultivation. As a general rule, grain and grass should not be grown in competition with young fruit trees, as these crops take the moisture from the soil at a time when it is needed by the trees. This is through the month of June and early part of July when the trees should make the greater part of their growth. If they are deprived of moisture at this time, the foliage becomes thin and yellow, growth is checked and the trees enfeebled. Cultivation helps to retain moisture, improves the tilth by making the soil fine, loose and open, and allows access of air to the roots.

Cover Crops.

The term Cover Crop is used for those crops which are grown in the orchard to be plowed under. They are usually sown in July after the period for cultivation has ended and occupy the ground only during the remainder of the season. They cover the ground when it would otherwise be bare and do not interfere with the orchard crop or operations.

The object of the cover crop is to check the growth of the trees in late summer and to induce an early ripening of the wood for winter. Cover crops also gather and hold soluble plant food, which might otherwise leach from the soil. By forming a mat or by holding the snow on the ground they protect it from deep freezing and from alternate freezing and thawing in winter. They prevent soils from washing. Cover crops add humus to the soil and if they are leguminous they also add nitrogen. If fruit trees are allowed to grow too late in the season the soft growth of late autumn is apt to be injured or killed by the first severe freezes of early winter. The cover crop by withdrawing the moisture from the soil tends to stop the growth of the tree and thus allow the wood and the buds to mature for winter.

Clover, vetch and buckwheat are the cover crops most commonly used in Nova Scotia, although rye, rape, cow peas and other plants are sometimes used. It is a good practice to have a rotation of cover crops, using several kinds in the course of four or five years. Among clovers, Common Red, Mammoth and Crimson Clover are used. The latter being an annual with a large seed makes a rapid growth and continues to grow late in the season, often remaining green until December or January. But it is sometimes difficult to get a catch unless the soil is in first rate tilth. If the orchard has received proper cultivation up to the time of sowing the cover crop, however, there should be little difficulty. Sometimes an application of lime or of phosphatic fertilizer is useful in making the cover crop succeed.

The two vetches in most common use as cover crops are the spring vetch or tare and the winter, sand or hairy vetch. The winter vetch is hardy, grows later in the autumn than the spring vetch and it is said to thrive on poorer soil. But the high price of seed, being $11.00 or more per hundred weight, or more than $6.00 a bushel, has prevented its extensive use in the past. The seed is smaller than that of the summer vetch and the plant has a tendency to stool out and spread over the ground. A smaller amount of seed per acre, therefore, is required than with the summer vetch, twenty to forty pounds being sufficient. The spring vetch costs about $2.00 per bushel. A bushel to the acre is the usual rate of seeding.

Buckwheat is a suitable cover crop to use on soils which will not grow good crops of clover or vetch. It completes its growth early in the season, however, being killed by the first fall frost. Rape grows until the first freezes of late autumn and stands up fairly well through the winter. Neither of these crops is leguminous like clover and vetch. They may be used until the ground is sufficiently improved for the growth of the legumes or they might be used in a rotation with legumes. The cost of the seed is less than that of clover or vetch. Buckwheat for a cover crop is sown at the rate of three pecks to a bushel per acre and rape, about three pounds.

Fertilizing the Soil.

In young orchards the chief aim is to maintain a healthy normal growth of the tree. Besides frequent cultivation, this requires that the soil be well supplied with the fertilizing materials used by plants. These materials include humus and what is ordinarily termed "plant food." Humus is decaying organic matter, supplied in barnyard manure, cover crops, or sod plowed under. Plant food as the term is here used consists of chemical compounds of nitrogen, of phosphorus and of potassium. These compounds are commonly spoken of as nitrogen, phosphoric acid and potash Plants use some fourteen different chemical elements in their growth but as these three are the ones most likely to be deficient in the soil they constitute what is usually understood by the term plant food.

Plant food may be supplied to young trees in the form of commercial fertilizer or of barnyard manure. Since nitrogen is important in the production of growth in plants it is advisable to use a commercial fertilizer containing a fairly high percentage of this element or to use barnyard manure, which contains much nitrogen and also supplies humus. Manure should not be used in excess, however, as it is then liable to cause too late growth and winter injury may be the result.

Barnyard manure is not always to be had in sufficient quantities for fertilizing the orchard. In such cases commercial fertilizers and cover crops afford a good substitute, the cover crop supplying the humus and sometimes part of the nitrogen. A complete fertilizer, that is, one containing nitrogen, phosphoric acid and potash may be used, or these materials may be applied in special fertilizers separately. Ordinary potato fertilizer or what is known as "mixed goods" sold by dealers would supply the materials needed by the trees or a home made mixture might be used. The following formula for such a mixture is recommended for young trees by H. W. Wolff of the New Hampshire Experiment Station:

200	pounds	nitrate of soda.
600	"	tankage.
800	"	basic slag
400	"	muriate of potash (if obtainable)

The quantity recommended for the first year is one pound of this mixture per tree, scattered around the trees within a radius of three or four feet of the trunks. This quantity should be gradually increased as the trees grow older until when the orchard has reached the bearing age the land receives an application of about 500 to 600 pounds per acre.

The object of using the tankage is to provide a source of nitrogen which becomes available gradually as the season advances, the nitrate of soda being available as soon as it is applied. If tankage cannot be obtained dog fish fertilizer might be used in its place or an equivalent of nitrate of soda may be put on at intervals of a week or ten days in two or three separate applications as it is needed by the trees. Muriate of potash is not now obtainable at a price which justifies its use. It may probably be omitted with less injury to the tree than either of the other two constituents.

Instead of making up a mixture such as the above or using a ready mixed fertilizer, many orchardists would prefer to apply the ingredients separately, using nitrate of soda for the nitrogen, muriate or sulphate of potash or wood ashes for the potash and one of the following for the phosphoric acid: acid phosphate, basic slag or bone meal. In such a case since the materials containing the potash and phosphoric acid do not readily leach form the soil, they might be applied in the spring along with the first harrowing, although any time that it is convenient when the orchard is being harrowed is suitable. The nitrate of soda should be put on in several applications at intervals of ten days or so through the early part of the growing season. Being very soluble and liable to leach from the soil it should not be applied before it is needed by the plant. It should not be put on in large amounts late in the season, say after the first of August. It would then have a tendency to keep the trees growing too late in the autumn.

The practice of one successful fruit grower in fertilizing young apple trees is to apply bone meal and nitrate of soda in about equal parts as to cost. Starting with five cents worth of these fertilizers per tree the first year, the amount is gradually increased until at the age of nine or ten years each tree receives twelve cents worth of fertilizer. Speaking roughly, this formula would call for about twice as much bone meal by weight as of nitrate of soda. If the land is rather poor and lacking in humus it might be well to make one or two light applications of nitrate again at intervals of ten days or two weeks in order to keep up a continuous supply of this material through the growing season.

For a full discussion of the subject of fertilizers, see the reprint of a series of articles on Soils, Soil Cultivation and Crops of Nova Scotia, appearing in the annual report of the Secretary for Agriculture, 1915.

Pruning of Young Fruit Trees.

The pruning of fruit trees may be divided into three parts (1) the initial pruning at the time of planting in the orchard, (2) the pruning from this time until the tree reaches into the bearing age and (3) the pruning of the bearing tree.

The pruning to be given at the time of planting has been discussed on page 36. It may be said here that if the tops of deciduous trees are not cut back somewhat at the time of transplanting they will not make as much growth as they otherwise would in the first year or two following the transplanting. The root system, which has been greatly reduced in digging up the tree and has not yet become well established in its new position, is unable to supply nourishment, especially water, rapidly enough to maintain the former rate of growth. The tree then appears to struggle during the first season. If there is a prolonged dry spell during the summer it may die. A moderate or rather severe cutting back of the top increases the vigor of the growth that year and lessens the likelihood of failure of the tree to grow. In the case of a two-or a three-year old tree this may consist in the removal of one half or more of the last year's growth. With such trees also this may be a good time to start the head, all branches being removed except three, four or five which are to form the framework of the top. These should be cut back one third or one half their length. Some growers prefer to cut back all the side shoots to one or two buds, leaving the selection of the limbs for the top until the next season. It is claimed that there is less drying out of the trunk when this is done than when some of the limbs are cut entirely back to the trunk. With all the branches thus cut back to spurs the tree sends out new growth the first year pretty nearly covering the upper part of the trunk with foliage. From this new growth, the limbs for the top are chosen the next year.

With one-year old whips the pruning at this time would consist in cutting back last year's growth, that is the trunk or whip, one third, one half or whatever distance best suits the planter. Sometimes whips are all cut back to an equal length, say 18 inches. From this trunk, branches arise forming a low headed tree or, if those branches are removed and a leader trained upward for one season, the head may be formed higher up. The branches selected to form the framework of the top should be evenly distributed around the trunk, they should form strong open crotches, and be situated some distance apart vertically, no two arising from the trunk at the same elevation from the ground.

From the time of its first pruning after the tree is set in the orchard until it comes into bearing, eight, ten or more years later, only moderate corrective pruning, as it is called, should be given. Experiments in pruning, as well as experience of fruit growers, tend to show that heavy pruning at this stage prevents the normal increase in the growth of the tree and delays the time at which it comes into bearing. This statement refers to pruning done in the dormant season. Summer pruning, it is claimed, may be done so as to make the tree bear at an earlier age and yield heavier crops than it otherwise would. The subject is now being investigated at several experiment stations. It is not sufficiently understood at present, however, to allow any definite directions to be given.

The corrective pruning necessary during the growing period of the tree, before it comes into bearing, consists in the removal of limbs that form poor crotches, the removal of limbs necessary to preserve the balance or symmetry of the top, limbs that cross or interfere with other limbs, weak, diseased or dead limbs and limbs or parts of limbs which are seriously in the way in cultivating.

If two branches arise from the trunk directly opposite each other, or at the same elevation from the ground they form crotches which are liable to split when the tree is laden with fruit. Limbs sometimes form very acute or narrow crotches with the trunk or main limbs. Snow and rain are apt to lodge in these crotches and ice to form there in winter. Cankers frequently arise in such places, resulting in serious injury to the tree. Limbs forming poor crotches should be removed as soon as they are noticed. Only limbs forming strong open crotches should be retained. Some varieties are more subject to the production of weak crotches than others and consequently need more attention in pruning.

Trees carry their load of fruit better if they are upright and their tops evenly balanced. When exposed to strong prevailing winds they are sometimes blown out of the proper position and the head or top becomes one sided. Staking when young may help to keep a tree upright. Pruning is useful in keeping the top evenly balanced Limbs that project too far on the heavy side of the top are headed back or removed altogether.

Limbs which cross and abrade each other soon wear through the bark allowing a foothold for canker, which shortly appears in such places if it exists to any extent in the orchard or in the vicinity. Limbs which cross the top of the tree, spreading their branches and foliage out among other limbs tend to crowd and shade those limbs. If these interfering limbs are not removed weak and dead branches appear later resulting in injury to the tree. Crossing limbs should be removed before they do any damage. Weak, diseased and dead limbs should be removed because they constitute a drain on the tree, form foot holds for disease and occupy space that should be given to healthy branches.

Branches, which droop, or grow downward to such an extent as to be in the way of cultivation or other orchard operations, should be removed. This does not mean that all limbs arising from low positions on the trunk should necessarily be removed. Limbs or branches of low headed trees which have been trained to grow in an upward direction are less likely to be in the way than are those of high headed trees which are allowed to come out horizontally. The drooping of these branches after the tree has come into bearing is almost sure to interfere with orchard cultivation.

Whether it is better to have fruit trees trained with low or high heads depends on the ideals of the owner and the system of orchard culture to be followed. Low heads, close planting of the trees and intensive orchard methods usually go together. High headed trees, the growing of intercrops as long as possible and orcharding as an accompaniment of other lines of farming form another combination.

In the past the prevailing idea of the proper height at which to form the heads of fruit trees has been influenced to some extent by the desire to avoid trouble in cultivating intercrops in an orchard These intercrops have usually been planted in rows parallel to the rows of trees and extending up to the trees. They have allowed the horses and implements to pass back and forth in one direction only. It was necessary that the limbs be high to enable the horse and implements to pass near the trees. As long as the cultivation of orchards was a side line to other farming and hoed crops were grown in them the trees had to be high headed. With the coming of an orchard system which makes the trees the first consideration and the intercrops secondary or excludes them altogether the requirements for cultivation are different.

If the intercrop is kept some distance from the trees more freedom is allowed the team in turning out for low limbs or low headed trees. In the cultivation of an orchard with no intercrop it is possible for the team to pass the trees in several directions, one direction being at right angles to another. With suitable implements, cultivation may easily extend close to the trunks of the trees without injury to the top. Low headed trees are now recognized to have so many advantages that the tendency is to train trees in this way more than formerly. From $2\frac{1}{2}$ to $3\frac{1}{2}$ feet now is a common height at which to start the heads of young apple trees where once it was 4 to 5 feet. Some fruit growers head their trees as low as a foot from the ground, or even at the ground, and experience no difficulty in cultivation. Much depends upon the direction in which the main limbs are trained. If they are trained upward so as to give a V-shaped top they may be more out of the way than those of the high headed tree. Limbs arising from a low position naturally tend to go upward more than do those arising higher up. Some of the advantages claimed for low heads in fruit trees are that the trees come into bearing earlier. There is much less exposure of trunk to the weather and diseases. The trees are more easily picked, sprayed, pruned and thinned. The trees and fruit suffer less from high winds. On the other hand the trees are more apt to be broken down by deep snow.

The Spraying of Young Orchards.

Fruit trees are sprayed to control insect pests and fungous diseases. Spray materials used for the control of insects are called insecticides, those for fungous diseases fungicides. Generally, in this Province, the most serious trouble for which apple trees are sprayed is the apple scab disease, caused by the black spot fungus. The spray mixture for most orchard operations contains a fungicide and the applications are timed with a view to prevent the growth and spread of the black spot fungus. An insecticide, however, is usually added to the mixture to kill any insects which may be on the foliage at that time or may appear shortly after. Two different pests then are treated by the same spraying operation.

Young orchards are usually not sprayed regularly until they reach the bearing age. It would often be better if they received the same regular spraying as the bearing orchard, especially if they are likely to suffer from attacks of the apple scab disease. If the proper insecticide were combined with the regular sprays for the black spot fungus most of the insect pests would be controlled along with the apple scab. Such spraying might not always be needed but since it is not known when an outbreak of insect or fungous trouble will occur it would be in the nature of insurance, automatically taking care of these pests if they come and relieving the owner of much anxiety.

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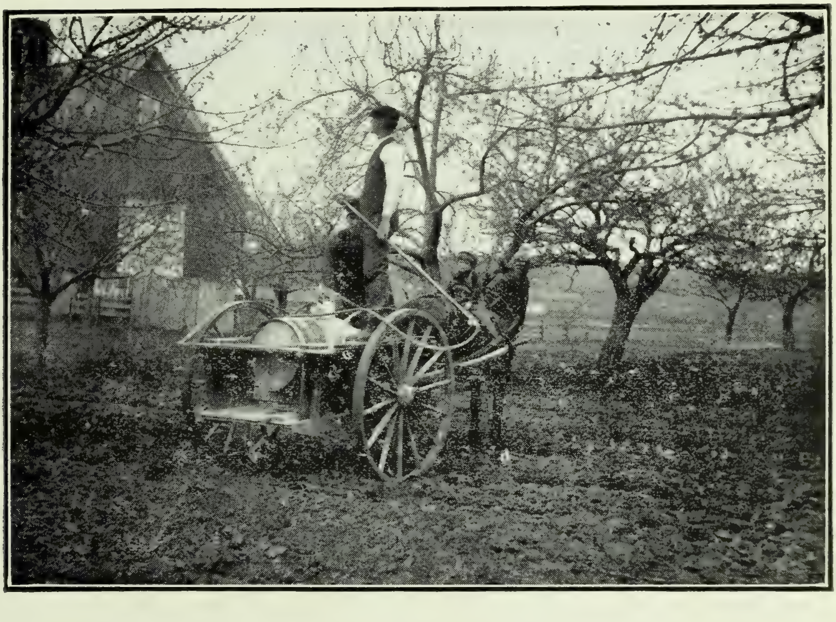


Convenient Spray Outfit for Small Orchards.

When young orchards are not regularly sprayed an outbreak of some insect pest may sometimes occur which threatens to do more immediate damage and consequently be more serious than the apple scab. In such cases the spray mixture would be made up and applied chiefly for the control of the insect. It would contain an insecticide and probably also a fungicide. The person who owns an orchard which is not regularly sprayed should watch for signs of the outbreak of any insect pest or plant disease and be ready to treat such trouble promptly when it appears. The important thing in all spraying operations is to know what one is spraying for, to use the right mixture at the proper time and to spray with thoroughness.

Bordeaux mixture was the first fungicide extensively used for the spraying of plants. It was named for Bordeaux, France, near which city its fungicidal qualities were accidently discovered about 1882. It is made of copper sulphate (blue vitriol), quicklime and water, usually in the proportion of 4 pounds of copper sulphate, 4 pounds of lime to 40 gallons of water, although a weaker mixture of 3 pounds of copper sulphate and 3 pounds of lime to 40 gallons of water is advisable if there is danger of injury to fruit or foliage. For a long time it was the most important spray mixture used on fruit trees for the control of fungous diseases. It is still the most effective fungicide in use and the best for potatoes and some other vegetables. But since it often causes serious russeting of the fruit and injury to the foliage of the apple it is not now used in orchard work as much as formerly. Lime-sulphur has largely taken its place as a spray material for fungous diseases of fruit trees. For a method of making Bordeaux mixture see page 50.

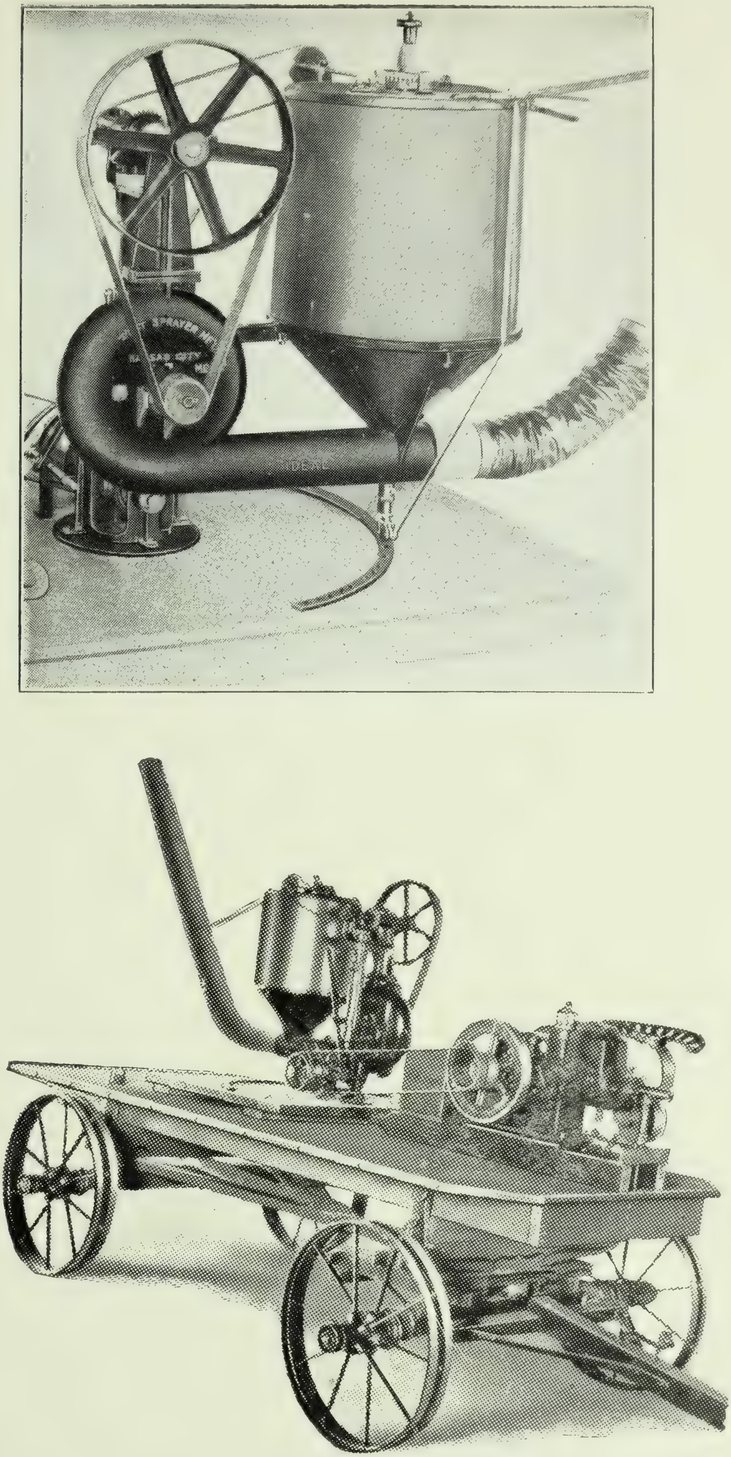
Lime-sulphur was first used on fruit trees as an insecticide for the control of the San Jose Scale. It was soon observed to have a beneficial effect on the health of the trees otherwise than in the control of the scale. In a very dilute form it was found to have a fungicidal value as a summer spray in the control of the apple scab disease. Since 1910 it has been the spray mixture most commonly used for this purpose in Nova Scotia. It is made by boiling quick lime and sulphur in water for about an hour, or until the sulphur is brought into solution. It may be bought from dealers for about 20 cents a gallon or from $7 to $8 per barrel. When used as a dormant spray for cleaning fruit trees of oyster shell scale and "moss" (lichen) the stock solution is diluted one part to eight or nine parts of water. As a summer spray for black spot fungus it is diluted from one to thirty up to one to fifty or over according to the strength of the stock solution and the time of application. Early in the season it is used at a greater strength than later when the trees have made more growth. If home made lime-sulphur is used it should first be tested with a hydrometer to determine its strength and the right amount of dilution. If used too strong it will burn the foliage. The commercial lime-sulphur is sold with a guaranteed strength and directions for dilution. On account of possible danger of injury to foliage and of causing the young fruit to drop it is better to dilute the lime-sulphur to the fullest extent recommended and then apply the mixture thoroughly.

Soluble sulphur is another material recently introduced as a fungicide. It has not yet come into very general use, although some growers prefer it to lime-sulphur. It is sold in the form of a solid which is readily soluble in water, making it convenient to transport and easy to prepare for use. It must be used in the form of a weak solution or it will cause injury to the foliage. Three quarters of a pound toone pound in 40 gallons of water is the strength usually recommended.

Sulphur dust, made by grinding the flowers of sulphur into a very fine powder, has lately been tried and recommended as a fungicide. It has sometimes given good results but at other times under different conditions it has not been as satisfactory. The advantages claimed for dusting with sulphur are that no injury results to the fruit or the foliage and a given area can be dusted in one fourth, or less than one fourth the time it can be sprayed.

Paris green was formerly the common insecticide used in spray mixtures for leaf eating insects. It was used with Bordeaux mixture at the rate of one third to one half a pound to 40 gallons of the mixture. It is rather quick acting and easily mixed with the spray liquid. It does not stay in suspension as well as some other poisons and cannot be used with lime-sulphur on account of causing injury to the foliage.

Arsenate of lead is a precipitate consisting of very fine particles which stick well to the leaves. Like other lead compounds it is slow in acting but is not likely to burn the foliage even if used in larger quantities than is necessary for the control of the insects. Besides, it is safe to use with lime-sulphur, increasing its fungicidal value. Arsenate of lead is used at the rate of 2 to 3 pounds to 40 gallons of spray mixture. Formerly it cost 8 to 15 cents a pound, according to the amount purchased but is now higher on account of the high price of lead.



A Dusting Machine used in New York State. Courtesy of Dust Sprayer Manufacturing Company, Kansas, City.

Arsenate of lime is a convenient poison to use for leaf eating insects. Being in the form of a dry powder, it is easily handled and stored. Its quick action makes it useful in combating insects like the cankerworm which are sometimes difficult to kill. It mixes readily with the spray liquid and may be used with either lime-sulphur or Bordeaux mixture. It is used at the rate of about one pound to 40 gallons of spray mixture. It should not be used alone as it may then cause foliage injury.

Arsenite of soda when added to a solution of lime becomes arsenite of lime. It may be used with Bordeaux mixture but with lime-sulphur it causes injury to the foliage. It is prepared by boiling one pound of white arsenic and two pounds of sal-soda (washing soda) in one gallon of water until the arsenic is dissolved. At the end of the process enough water is added to replace that which has been lost by evaporation. One quart of this arsenite of soda added to 40 gallons of Bordeaux mixture in which there is an excess of lime becomes arsenite of lime and acts quickly on leaf eating insects. Since arsenate of lime can be bought all ready prepared and is not likely to injure the foliage even with lime-sulphur the arsenite form is not used much now on fruit trees. Arsenite of soda is caustic and cannot be used on foliage.

For a full account of the spraying for biting insects of the apple see the article on this subject in this report by Mr. G. E. Sanders, Field Entomologist, Dominion Department of Entomology.

For sucking insects arsenical poisons are useless. An insecticide which kills by contact must be used. For oyster shell scale a dormant spray of lime-sulphur of a strength of 1 to 8 or 9, or specific gravity 1.03 should be used.

For the aphis kerosene emulsion, soap solution or black leaf 40 should be used. The latter is probably the most convenient for large areas.

Kerosene emulsion is made by dissolving one half pound of soap in one gallon of hot water to which is added two gallons of kerosene. The liquid is pumped back into itself forcibly until it becomes a creamy mass or is thoroughly emulsified. It should be diluted with water ten to fifteen times for use on foliage.

Hard, soft or whale oil soap dissolved in hot water and used at the rate of one pound to five or six gallons of water is effective against the aphis if used early and often and applied thoroughly each time. It is satisfactory for use on small trees and bushes and on small areas.

For a large area of full grown fruit trees black leaf 40 is a more convenient and satisfactory insecticide for sucking insects, such as the aphis. This is a strong tobacco extract containing 40 per cent nicotine sulphate. It can be used with other sprays such as lime-sulphur, lead arsenate and soap solution. About two fifths of a pint is used to 40 gallons of spray mixture.

For a full account of the spraying for sucking insects see the article on this subject in this report by Professor W. H. Brittain, Provincial Entomologist.

TO PREPARE BORDEAUX MIXTURE.

Dissolve a given number of pounds of blue vitriol in as many gallons of water by suspending the vitriol in a cloth or sack near the surface of the water. It dissolves more quickly when pulverized than when coarse and in hot water than in cold. This is the stock solution of blue vitriol. In another vessel slake a given number of pounds of stone lime in as many gallons of water. Use a small quantity of water to begin the slaking of the lime—enough to keep it from getting too dry and not enough to drown it, but ending up with the same number of gallons of solution as the number of pounds of lime. This is the stock solution of lime. Stir the stock solution of vitriol well and dip out four gallons into a barrel or wooden vessel holding twenty gallons or more. Dilute this solution to twenty gallons. Stir the stock solution of lime well and dip out four gallons into another vessel, diluting it the same as the blue vitriol solution. Now pour the two diluted solutions together through a strainer made of brass wire with fifty meshes to the inch or through cheese cloth, into the spray barrel, stirring the mixture constantly while the ingredients are being poured in. The result will be forty gallons of Bordeaux mixture made according to the 4-4-40 formula. If a weaker strength is required, less number of gallons of the stock solutions should be used. It is the lime solution which needs straining to prevent clogging of the nozzles. The blue vitriol may all be put into the cask first and the lime solution added afterwards but some persons think they get a finer precipitate by pouring them together through the strainer..

There are several ways of making Bordeaux mixture The important point is to have one of the stock solutions diluted to its fullest extent, or both solutions so diluted before pouring them together. If only one is diluted, it may contain nearly as many gallons of water as the spray cask or tank will hold. If both are diluted, they should each contain half as much as the capacity of the spray cask or tank. Never pour the two together when both are in the concentrated form. The resulting Bordeaux mixture would then consist of a coarse precipitate which would settle quickly and not admit of as even distribution over the foliage as it otherwise would.

Bordeaux mixture should be used as soon as possible after it is made and be kept agitated as it is applied. The spray pump, hose, rod, and nozzles should be thoroughly washed out after spraying to prevent injury to the apparatus. Rubber hose should be hung on wooden pegs or supports to allow the liquid to drain out. Iron hooks or nails are liable to cut through the rubber.

P. J. S.

LIME-SULPHUR

The most important fungicide for fruit trees at present is lime-sulphur. It is made by boiling quicklime and sulphur together in water until the sulphur forms soluble compounds with the lime. The cheapest sulphur to use is a finely powdered form known as "commercial flour" of sulphur, costing from 2 to 3 cents a pound in hundred pound lots. In larger quantities it can sometimes be bought for less than 2 cents a pound. Freshly burned lime the best obtainable, should be used. It should contain 90 to 95 per cent pure lime, or calcium oxide and as little magnesia and other impurities as possible. If the sulphur costs $2.50 and the lime $1.00 per hundred weight the cost for materials for a 40-gallon barrel of lime-sulphur would be about $3.00. The cost of the equipment and fuel and labor would be extra but the fuel can usually be picked up on the farm.

Lime-sulphur is made in several ways. The two following articles by experienced orchardists describe slightly different methods according to the way the sulphur is added. Either method properly carried out will give good results.

The Making of Lime-Sulphur Concentrate.

F. H. Johnson, Bridgetown, N. S.

For making Lime sulphur I use the following formula:

50 lbs. lime.
100 lbs. sulphur
40 gals. water.

In making it in open boilers, the work can be done much more quickly by having two boilers side by side than by using only one.

To make the boilers, I use 2 in. plank for the sides, about six ft. long and 18 inches wide. They are rounded up at the ends like sled runners. A full strip of sheet iron is nailed on the bottom of the side pieces and turned up at the ends, making the boiler complete. It should be set up on a brick or concrete foundation 18 to 20 inches high, allowing space for a fire underneath. This fire place is closed at one end except where a stove pipe is inserted for a chimney.

Put 40 gallons of water in the boiler and add the 100 pounds of sulphur at once, taking care that all the lumps are finely pulverized. The lumps may be broken up by passing the sulphur through a fine sieve. The liquid should be stirred until it starts to boil. Then slowly add the 50 lbs. of lime. If all the lime is put in at once it will boil over. Boil for from 45 minutes to one hour. A little water should be added from time to time to make up for the loss from evaporation. The liquid should not be allowed to fall below 40 gallons at any time. Fifty pounds of lime and 100 pounds of sulphur boiled in 20 gallons of water with 20 gallons of water added after it is boiled will not give as good a mixture as the same amount boiled in 40 gallons. While hot it should be strained into tight casks through a wire strainer with not less than 25 meshes to the inch.

If there is a chance to get steam with which to do the boiling, it facilitates the process of making but does not make any better mixture. Newly made lime-sulphur will test about one degree less than it will after it has stood for a few weeks.

Lime-Sulphur Concentrate.

(*Home Boiled*).

L. D. Robinson, Berwick, N. S.

All doubts as to the efficiency of Home Boiled Lime-Sulphur have been dissipated, and a great saving effected by the home production of this spraying material. It is a process which the average orchardist can easily master, if he will carefully follow a few plain directions which it is the purpose of the writer to lay down.

Lime	*Sulphur*	*Water*
1	2	1

The approved formula for the manufacture of this product is:

1 lb. best stone lime free from air slaked material.
2 lbs. sulphur.
1 gal. water.

This formula should be rigidly adhered to, especially in the matter of never letting the number of gallons of liquid fall below the number of pounds of lime at any time during the process of boiling.

The Boiler.

Secure a sheet of galvanized iron, say 6 x 2½ feet, and double nail this on the bottom of a tank constructed of 2 inch plank firmly spiked together, and capable of holding not less than 75 gallons. This should be set upon a brick or cement foundation not less than 2½ feet high, with an opening, preferably on the west end, for putting in the wood, and a large sized piece of stovepipe at the other, to carry off the smoke and to create a draft.

The Process.

There are two methods of starting the manufacture of Lime-Sulphur Concentrate. Either the lime may be first slaked and then the sulphur and water added, or the sulphur may first be stirred into the water and the lime added. My preference is for the first method, which is as follows:

Place 15 gallons of water in the boiler and start a brisk fire. Drive a nail in the side of the boiler at the surface of the liquid. Now continue to add water till the boiler contains 50 gallons and drive a nail as before. When the water begins to boil remove all of it to an open cask, except the fifteen gallons as indicated by the nail, and add 50 pounds best clean stone lime. When the slaking is well under way add 100 pounds sulphur, free from lumps. Vigorous stirring should now begin and be maintained until the end of the process, especially up to the time when vigorous boiling begins.

As soon as the mass has been reduced to a smooth paste, water being added if necessary, put back the hot water previously removed, and if it is not sufficient to reach the 50 gallon mark, add cold water. Bring to the boiling point as soon as possible, stirring constantly, and adding water from time to time so as to keep the top nail covered. Mark the time by the watch when active boiling begins and continue vigorous boiling a full hour. Then immediately remove the concentrate to the cask.

Last spring the writer of this article manufactured some 60 bbls. Lime-Sulphur Concentrate, and was able with few exceptions to secure an almost uniform test of 26 degrees Beaumé strength. S. B. Chute used this almost exclusively in his spraying operations with the very best results.

A person who makes lime-sulphur for a summer spray should use a hydrometer to test its density so as to know what dilution to make in order to avoid foliage injury. Hydrometers are now made expressly for testing lime-sulphur and are graduated to show the specific gravity of the liquid, or its density in degrees Beaumé.

Commercial lime-sulphur usually tests from 32 to 34 degrees or has a specific gravity of 1.283 to 1.304. The home-made article may test 25 or 26 degrees which is the equivalent of 1.208 or 1.219 specific gravity. To determine the number of dilutions of the concentrate or stock solution to make in order to obtain a spray mixture of a given density divide the decimal of the specific gravity of the concentrate by that of the specific gravity of the required spray mixture. For example, if the specific gravity of the concentrate is 1.304 and a spray mixture of 1.008 is required, .304 ÷ 008 = 38, the number of dilutions to make. Thirty-eight dilutions are made by adding 37 volumes of water to one of lime-sulphur concentrate.

The following table adapted from Cornell Bulletin No. 289 shows the number of dilutions to make of lime-sulphur concentrate of various densities to be the equivalent of given dilutions of one testing 32 degrees Beaumé.

Strength of Concentrate.		Dilutions required to make a strength the equivalent of one testing 32 B. diluted as follows.						
DEGREES B.	Sp. gr.	1-10	1-15	1-20	1-25	1-30	1-40	1-50
25..........	1.208	7.4	11.0	14.7	18.4	22.1	29.5	36.8
26..........	1.218	7.7	11.6	15.4	19.3	23.2	30.9	38.6
27..........	1.229	8.1	12.1	16.1	20.2	24.3	32.4	40.5
28..........	1.239	8.4	12.7	16.9	21.1	25.4	33.8	42.3
29..........	1.250	8.8	13.2	17.6	22.1	26.5	35.3	44.2
30..........	1.261	9.2	13.9	18.4	23.0	27.6	36.9	46.1
31..........	1.272	9.6	14.4	19.3	24.0	28.8	38.4	48.0
32..........	1.283	10.0	15.0	20.0	25.0	30.0	40.0	50.0
33..........	1.295	10.4	15.6	20.8	26.0	31.2	41.5	52.0
34..........	1.306	10.8	16.2	21.6	26.8	32.4	43.2	54.0
35..........	1.318	11.2	16.8	22.4	28.0	33.4	44.9	56.0

If a home boiled mixture tests 26 degrees B., for instance, and it is desired to dilute it to a strength equal to that of a concentrate testing 32 degrees which has been diluted 1 to 40, the home-boiled product would be diluted 30.9 times, or for every gallon of the stock solution 29.9 gallons of water would be added.

P. J. S.

WHAT ONE APPLE TREE HAS DONE.

Joseph A. Kinsman, Lakeville, Kings Co., N. S.

On the farm of Mr. Joseph A.Kinsman, in Lakeville, Kings Co., stands the champion apple tree of Eastern America. A letter written by Mr. Kinsman on April 15, 1899, contains interesting information about this tree. Mr. Kinsman, under that date, wrote:

"It is a pleasure for me to give particulars about the remarkable Gravenstein apple tree of which I have been the owner since 1878. This tree is situated on my farm, at the base of the North Mountain, in Lakeville. It grows on the side of the bank of a ravine that makes down from the mountain, in which a small stream of water runs, the roots of the tree running into this stream. The trunk of the tree is nearly three feet in diameter. The limbs begin to branch out about six feet from the ground; the branches have a spread of over eighty feet. The tree is now one hundred years old. It was grafted to Gravenstein some thirty years ago. I have about twenty five acres of orchard, but I have no tree more thrifty than this one. It only bears on alternate years, as a rule. On some off years it might have four or five barrels of apples. It is not cultivated in any way, nature having provided everything that is wanted for this tree. I have kept a record of the apples that it has borne since I owned it, which is as follows:

In	1878	it produced	15	barrels of merchantable	fruit.
	1880	“	18	“	“
	1882	“	21	“	“
	1884	“	20	“	“
	1886	“	21	“	“
	1888	“	23	“	“
	1890	“	20	“	“
	1892	“	21	“	“
	1894	“	26	“	“
	1896	“	27	“	“
	1898	“	22	“	“
		Total	234	at $2 per barrel....	$468

I have made no account of the apples that dropped during those seasons, nor have I of the loss in picking, which is very great, owing to the top being nearly fifty feet high on one side, on account of its position on the side of the bank. In 1896 I should have had over 30 barrels, if it had not been for an accident in the breaking of a large limb from the top, in August. The apples have averaged me $2 per barrel.” This tree is still living and bearing good crops of fruit.

Hundred Year Old Apple Tree on Mr. J. A. Kinsman's Farm. Still Bearing Good Crop.

WHAT A SMALL ORCHARD CAN DO.

The following is a record of a small orchard on the property of Judge Chipman, Kentville, N. S.

This orchard was planted in 1883. It originally contained 22 trees of the Blenheim Orange variety, and covered an area of two thirds of an acre. Root crops were grown in the orchard for the first 10 or 11 years. Thereafter it was given clean cultivation with the plow and harrow. Stable manure was largely used during the early years of the orchard's life, then commercial fertilizers in the form of bone meal and muriate of potash. During the last 8 or 9 years the fertilizers applied have been acid phosphate, muriate of potash and nitrate of soda, the latter in small quantities.

Product of 22 *Blenheim Orange trees from* 1892 *to* 1898.

In 1892 at 9 years of age	 22	barrels	
1894 " 11 "	 50	"	
1896 " 13 "	 80	"	
1898 " 15 "	 90	"	
			242

One tree not producing after 1898.

In 1900 at 17 years of age	130	barrels	
1902 " 19 "	160	"	
1904 " 21 "	140	"	
1905 " 22 "	 60	"	
1906 " 23 "	130	"	
1907 " 24 "	 15	"	
1908 " 25 "	 90	"	
1909 " 26 "	183	"	
1910 " 27 "	..... 4½	"	
			912½
			1154½

During the past eleven years the yield from this orchard has averaged about 83 barrels per year, or at the rate of nearly 125 barrels per acre. At $2 per barrel, tree run, this means a yearly return of $250 per acre.

A LITTLE FRUIT FARM IN THE ANNAPOLIS VALLEY.

G. C. Miller, Middleton, N. S.

About 36 years ago the writer moved on to the premises he now occupies. It consisted of ten acres of ordinary land, based on the Annapolis River—9 acres of it cutting hay, and the other acre under cultivation with apple trees just set. As a farm it was too small, and, as viewed then, the acre orchard was all the 9 acres of hay land could maintain. Not caring for live stock, and having little knowledge of it, anyway, the problem of a living from so small a farm seemed a serious one. Reading in a book on small fruit culture a letter from J. H. Hale, of Connecticut, in which he set forth his success with strawberries on fertilizers alone, correspondence was opened with him, with the result that it was determined to go out of the hay business and devote all the land available to strawberries, raspberries, currants, gooseberries, and plums. Only 8 acres were suitable for this purpose, the remaining two being intervale and land occupied by buildings. Much interest centered in this little farm through the next 10 years. During this time it was practically the experimental farm of western Nova Scotia. People came from every section of the country to see the immense crops grown on fertilizer alone. The annual turn off from these 8 acres was never less than $1,500 and one year it went as high as $1,800.

This was the first demonstration of the fact that good commercial fertilizers, as plant food, are just as nourishing to plants as ordinary food is to animals. Numbers of progressive men noted the good results obtained from them on the farm in question, and observed that there was no evidence of results falling off. They very logically reasoned that what was being done on a few acres could be duplicated on any number, and with this conclusion they went home to plant the present beautiful orchards, 15 to 20 years old, and covering areas of from 25 to 100 acres.

During these successful years of small fruit culture, little attention was paid to the larger fruits, such as apples and pears and here was a vital mistake. The writer supposed he would always want to grow the small fruits, and knew that apple trees would in the course of years shut them out. However, the time came when it was deemed expedient to make a change, and then was discovered the error of not having the trees out while yet cultivating strawberries. The single acre at the start, however, had been added to, so that when the remainder of the 8 acres was set, a fair knowledge of orchard culture had been obtained, besides an unswerving faith in the ability of suitable commercial fertilizers to produce the very best results, and the present time over 45 acres of fine orchard, from 30 years down to 5, are shown in evidence. Practically not a tree of all these ever has had anything but commercial fertilizer.

A system that has given profitable results, and which enables a planter to consult his own taste as to the extent of his orchard without consideration of livestock, may be well worth looking into, not that the writer would ignore orchards fertilized with stable manure, but because there are so many people who have not the land for both orchard and hay, besides many who would never have an orchard if its existence depended on stock and the care entailed thereby.

Omitting the important point of selection of varieties, planting, and care while yet young, we come to the bearing orchard of 15 years or more. The writer gives his own method of culture and fertilization and would say that while there are many other methods giving good results, he knows of none that could so well meet his needs, or give as profitable results for the labor and money invested.

Fertilizers.

It is known to most farmers that the three essential elements of plant food are phosphoric acid, potash and nitrogen. With an abundance of these in available form, the soil seems capable of supplying all other elements necessary for maximum crops. To furnish what the tree and growing fruit require in proper proportions is an important point in orchard fertilization. A superabundance of either one of the elements mentioned might not noticeably increase the crop, and would be bad economy if not waste. All are required in a certain proportion, and where this proportion is not observed, expense is incurred without correspondingly good results. Scientists have told us that from 50 to 60 pounds of phosphoric acid, and from 75 to 100 pounds of potash, (K_2O,) yearly are quite sufficient to insure a crop of from 100 to 125 barrels of fruit as long as this application is kept up, provided that sufficient nitrogen is supplied by proper cover crops. This calculation includes what wastage might occur in the soil while the process of assimilation is going on. The above can be secured from several sources, 250 to 300 pounds of bone meal will supply the necessary phosphoric acid, but as it carries three to four per cent of nitrogen and costs proportionally, and as nitrogen can be supplied in the cover crop at a nominal cost, it is not considered the most economic source of phosphoric acid to use. Four hundred pounds of acid phosphate would supply about the same available phosphoric acid as the bone, and at a cost less the value of the nitrogen in the bone. A special orchard fertilizer containing only phosphoric acid and potash, from which all excess of acidity has been eliminated, has been found by the writer to give the best results in orchard fertilization, and it is from this preparation that results given have been obtained.

The application is made with the first cultivation in spring. It is sown broadcast by hand or machine, as the roots practically intersect the whole area of soil when the trees are from 15 to 20 years old. It can be cultivated in with a disc harrow; in fact there is very little use for a plow in any orchard having a fairly light soil. Clay or clay loam would be the better for fall plowing, but not over four inches deep. Keep the cultivation up weekly, alternating between the disc, spring tooth and smoothing harrow, as the surface of the soil as to roughness indicates. Should a rain come, do not wait for a week to pass, but as soon as dry enough break the crust caused by the dampness with any kind of a harrow suited to the purpose. This will prevent evaporation of the moisture so necessary to supply the setting of fruit, without which a large proportion of the young apples would be likely to fall, if the season happened to be dry.

The Cover Crop.

This is sown with the last cultivation, and it has been found best not to make this too late. From June 20th to July 1st would be about the right time, according to the nature of the season. If put off until later, the summer dryness is apt to interfere with the germination of the seed, and thus defeat an important factor in the system. Crimson clover has been found very valuable as a cover crop. Sown about 14 pounds to the acre, it makes a heavy growth the first year, and supplies the necessary nitrogen to balance the chemicals applied. It does more than this, however, as it supplies an abundance of humus without which no soil can be successfully worked with artificial fertilizers. Vetch also makes a good cover crop when it succeeds, and it can often be used where the shade of the trees is too dense for clover. Being a nitrogeneous plant, it also completes the trio of fertilizing elements necessary for the orchard.

It may be best to plow or disc the cover crop in after all the leaves have fallen, as this is supposed to be a preventive of the spread of apple scab, but in the past, except in the case of heavy soils, the cover crop has not been put under till spring.

Cost of Fertilization.

This is the touch-stone to which everything must yield, and we claim the system advocated will give indefinitely better results than any other known. It is a system that demands just the material required to make fruit, and in as exact proportion as science can indicate. Under this system each tree may be regarded in the light of a factory, changing well selected raw material into the finished product. Nothing can be more reasonable, nothing more simple. To produce the results given below, the retail cost of fertilizer has only been from $8.00 to $9.00 per acre, or about 8 cents per barrel. My average has been 110 barrels for 10 consecutive years, omitting the present year. This means 1100 barrels from every acre of orchard in the time named of good packed fruit. This completes my experiments along the line of low fertilization, and the results are gladly given to my brother orchardists. Now the question arises, how much has been lost by following so closely a system that furnishes material, seemingly, inadequate to the needs of a heavy crop? How much more of the same fertilizers could have been profitably used? Would fifty per cent or one hundred per cent more have increased the crop proportionally? These are live questions to the man whose interests lie largely in apple trees, and are questions which the writer now turns to with full purpose of making a satisfactory solution.

Results.

Below is an account kept with the only four acres of orchard in full bearing at the time it was made. It is a fair index of many other like crops, and in no way misleading, as many others, with the same treatment, have done even better.

Pruning	$ 10.00
Fertilizer, 4 acres at $9	36.00
Sowing fertilizer	2.00
Discing and harrowing	8.00
Seed for cover crop	5.70
Sowing cover crop	1.50
Spraying three times	22.40
Barrels, 451 at 25c	113.00
Picking, packing and truckage, at 25c	113.00
Sundry expenses	8.40
	$ 320.00
451 barrels apples, net proceeds	1017.74
Net returns	$ 697.74

This is but a fraction short of $175, net, per acre, or 17½ per cent for the owner on a valuation of $1,000 per acre. This seems better than bank stock yielding 4½ per cent, or even gold mines in the West, which promise wealth quickly, but usually wind up with loss of expected dividend, and investment as well. The statement of 17½ per cent returns is not given as something wonderful or phenomenal. On the contrary it is sent forth with the full knowledge that even better results have been obtained by many persons known to the writer, who have fertilized with the sole view of heavy crops, rather than of demonstrating a rule which could be worked out by any one along scientific lines. It shows what is possible to all who intelligently apply themselves to pleasant, healthful orchard work in the beautiful Annapolis Valley of Nova Scotia.

APPLE SCAB AND HOW TO CONTROL IT.

Dr. Errett Wallace, Washington, D. C.

From the point of view of the practical man the main object in growing apples is to produce smooth, clean, handsome fruit and plenty of it. Probably more than ninety per cent of the fruit that must be graded as second and third class must be so graded because of injuries from the scab fungus or the codling moth. Furthermore, in many cases these pests not only decrease the quality, but also very materially reduce the quantity of fruit. One of the most important problems for the grower, then, is to determine the best possible means of controlling these two pests.

The first and most important question is "When shall we spray?" This is more important than the other question, "What shall we spray with?" We are convinced that the poor set of fruit in some sections of New York State the past season was due to no reason other than that the spraying was not done at the right time. Hundreds of thousands of dollars are lost each year because of such mistakes and neglect in regard to spraying. The scab disease of apples is caused by a very minute plant which we call a fungus. It grows in the skin of the apple forming the black spots so familiar to all. Every scab spot starts from a spore (or seed) which germinates, grows into the skin of the leaf or apple and continues to grow until the scab spot is formed. Now it is just as impossible for these spores to germinate without moisture as it would be for a wheat seed to germinate in a dry bin in the granary. This explains then why we have so much more scab during wet than dry seasons.

Now we may ask, "How does the spray prevent infection?" It does so by coating the surface of the young fruit with a substance which prevents the spores from germinating. Bearing this in mind we can return to the question, "When shall we spray?" We must spray before this infection has taken place. Since infection takes place in the rain, or while the trees are wet, we must spray before rains to prevent it. This is a disease you cannot cure, you must prevent it. Do not wait until the rain is over fearing that it will be washed off. Twenty minutes to dry before the rain comes is sufficient to hold it quite well. After the wet weather is all over, the spray is not needed. How early in the season must we begin to spray? This depends largely on how early the spring crop of spores is ripened up. The fungus is carried over winter on dead leaves on the ground, developing a crop of spores in the spring which are shot into the air, like peas from a pop gun, and carried to the young leaves and fruit buds by the wind. Watching this for the past three years, we find that in New York State these spores begin to ripen up about the time the blossoms are ready to open. Therefore we can usually prevent the early scab infection by spraying just before the blossoms open. This application is important when the early season is wet, for two reasons. First, the scab attacks the stems of the blossoms and they fall. You will complain of a poor set and consequently a light crop. Secondly, it attacks the leaves; and although often not conspicuous it breaks the skin of the leaf so that when the spray is applied later, it enters the leaf and burns it. We are often asked how early may this first application for scab be given? Will the dormant spray for blister mite made before the leaf buds burst answer for this also?

Remembering what I have already stated, that we prevent scab only by coating the surface of the young fruit bud and leaf to prevent the fungus from getting into it, the case seems clear. How can we coat the buds and leaves with the spray before they are opened? The only conditions under which a dormant spray could be expected to be effective would be in exceptional cases where twig infection occurs. This is not all theory, however. We have tried it for the past two years, and find that under the conditions of our experiment the dormant spray had practically no effect in controlling apple scab. The proper time, then, for the first application for scab, at least under New York conditions, we find to be after the buds and leaves are exposed, so that you can get at them, but before the blossoms have opened, getting it on ahead of the rains, if possible.

I wish to emphasize again how important this application may be. We feel confident, after having observed results in a large number of orchards in Western New York, that the failure of the fruit to set was in many cases due to an early attack of scab. Our own experiments at Sodus also added evidence to this conclusion. Properly sprayed trees uniformly had a much better set of fruit. On pears this was demonstrated beyond doubt.

A block of 75 Duchess trees well sprayed in our experimental plot yielded 16 times as many pears per tree as the adjoining tree in the same orchard sprayed by the owner, only after the blossoms fell. The set was poor in this case even on our plot, but the contrast was evident, nevertheless. It is true that these results would not obtain every season. If we were sure the early season would be dry, this early spraying could be omitted without loss. It is largely, then, a form of insurance. Perhaps if one could watch the weather closely enough, this could be omitted many seasons. The second application should be given immediately after the blossoms fall, or when about two thirds have fallen. But this time new surfaces have been exposed by growth, which will not be protected by the early spray. This is usually found to be the most important of all from the standpoint of producing scab-free fruit.

If only one application is to be given, I should make it at this time. This is also the most important in controlling the codling moth, and the poison combined with the fungicide makes this application the most important one for the two worst enemies of the apple crop, the scab and the codling moth. This should never be omitted. The third application should be made about two weeks after the second. Like No. 1, its importance will vary with the season.

Some seasons a fourth is found to be necessary, about seven to eight weeks after the third to prevent a late infection that sometimes occurs about as the fruit begins to ripen up, and also to protect against a possible second brood of codling moth. Whether either of these possibilities require consideration under Nova Scotia conditions or not I shall not undertake to say.

Now comes the question, "What shall we spray with?" As you all know, Bordeaux mixture has long been the standard fungicide for this purpose. It has been very efficient in controlling the fungus but has under certain weather conditions shown a decided tendency to russet the fruit and in some cases cause objectionable foliage injury. This has been known to occur in many cases, where all known precautions have been taken, and it has been demonstrated beyond doubt that wet weather following soon after the application favors Bordeaux injury, causing russeting of fruit and burning of foliage. It is only within the past two years that considerable agitation has been aroused concerning the substitution of sulphur compounds for Bordeaux in the control of fungous diseases of plants. Confining ourselves to the work on apples we find that concentrated lime-sulphur solution properly prepared and applied, in combination with lead arsenate, has been successfully used in an experimental way for the past four years and by many practical men on a commercial scale during the past season.

Prof. Cordley of Oregon, reports successful control of apple scab as early as 1907, and that the russeting of fruit which resulted from the use of Bordeaux was avoided. His results were equally good in 1908 and 1909. Scab was as effectively reduced in every case by lime-sulphur as by Bordeaux. There was no russeting on lime-sulphur sprayed fruit, while on the Bordeaux plats it ran from 31 to 52 per cent. Professor Scott of Washington, D. C. reports experiments in Arkansas in 1908, and in Virginia in 1909. The results in both cases agreed in general with those obtained by Cordley in Oregon.

Scab was controlled as well by lime-sulphur as by Bordeaux, and very slight or no russeting of fruit followed the use of the lime-sulphur spray.

Professor Brooks, of New Hampshire, reports that in 1908 scab on MacIntosh was reduced from 61 to 15 per cent by Bordeaux, and to 14 per cent by lime-sulphur.

In 1909, at Cornell, scab on Greenings was reduced from 42 per cent to 3.6 per cent by lime-sulphur., (1-30), and to 3 per cent by Bordeaux. In 1910 it was reduced from 98 to eleven per cent on Baldwins by lime-sulphur, and to 18 per cent by Bordeaux in one orchard and to 14 and 17 per cent respectively, in another. On Greenings it was reduced from 79 per cent to 10 per cent by lime-sulphur and to 17 per cent by Bordeaux. The Hubbardston had 94 per cent on the unsprayed and 3 per cent on the lime-sulphur trees. There were no Bordeaux trees of this variety. Another Greening orchard gave 6.9 per cent on trees sprayed with lime-sulphur, and 6.6 per cent on the Bordeaux plat.

Summarizing these results, we have a record of three years for Cordley, in Oregon, two years for Scott in Virginia and Arkansas, not including the present season, and two years of our work at Cornell. Aside from this experimental work, a few growers made the venture and used lime-sulphur as a summer spray in 1909 and a very large number in 1910. Some conflicting results are reported, as would be expected. The conclusions to be drawn from the sum of all this work, however, is that lime-sulphur solution, properly prepared and used, may be successfully substituted for Bordeaux mixture as a summer spray for apples; its chief advantage being that it largely, if not entirely, avoids the danger of russeting of the fruit which so often follows the use of Bordeaux, and that aside from russeting, the fruit has a decidedly finer finish where lime-sulphur is used. It is well known that Bordeaux injury is most likely to occur when wet weather follows soon after the application. With the lime-sulphur spray, we seem to be less at the mercy of weather conditions. The chemical properties of the two fungicides are entirely different. In properly made Bordeaux, the copper which is doubtless the caustic or burning ingredient, is in the insoluble, or harmless form when applied and does not cause injury until it has been chemically changed by exposure to certain weather conditions. In case of lime-sulphur, the soluble sulphur which is doubtless the caustic ingredient, is applied in the soluble form and soon changes to the insoluble. We are convinced then that whatever burning is caused by lime-sulphur, is caused at once, while the spray is drying on the tree. The weather following the application would, therefore, be expected to have little or no influence on the amount of injury in the case of lime-sulphur. In fact we have sprayed with lime-sulphur in all kinds of weather, and from carefully kept notes, have been unable to correlate the amount of injury with any particular weather conditions. We are convinced, however, that the weather conditions of the season previous to time of application may have an influence in producing a foliage that is more or less susceptible to injury. We have noted that, in general, apple foliage seemed to be more easily burned by lime-sulphur in 1910 than in 1909 in New York State. This we believe to be partly due to the fact that the wet spring of 1910 was more favorable to fungus infection which as already described, made the leaves more susceptible to spray injury. It is also quite possible as claimed by Prof. Cordley that the season affects the leaf physiologically to make it more or less susceptible to spray injury.

It is therefore true that while there seems to be little danger of fruit injury from lime-sulphur, we do have the problem of foliage injury to contend with. Many growers have had slight, and a few quite objectionable injury. In most cases this occurs all at once, and the trees soon recuperate.

What we want to know then is, what precautions can be taken to avoid the danger of an objectionable amount of foliage injury. Most cases that we have been able to inspect personally have been traceable to one or both of two causes. In many cases a microscopic examination would reveal the fact that the scab fungus was present in almost every burned spot, and in many cases the trees of certain branches had been too heavily drenched. Over-drenching of the foliage is very likely to cause injury some seasons. The spray should be thoroughly applied or evenly distributed so as to coat all parts, remembering that the spray only protects those buds that are actually coated. On the other hand, holding the nozzle still in one place too long to overdrench that part of the tree should be avoided. We have been able in this way to spray many acres of orchard, satisfactorily controlling scab and codling moth and retaining as healthy a foliage as may be desired. A slight spotting of some leaves occured soon after the application, but this could hardly be detected a few weeks later.

Another important question is what poison can be combined with the lime-sulphur to control the codling moth and other insects? All the above discussions refer to the use of lime-sulphur combined with lead arsenate. It had been predicted that the addition of lead arsenate would reduce the fungicidal value of the lime-sulphur solution because of a chemical reaction. We have tested this point very thoroughly this season and find that the effect is exactly the reverse of this prediction. The fungicidal value of lime-sulphur seems to be almost if not quite doubled by the addition of the lead arsenate. Evidently, then, the chemical change is beneficial rather than otherwise. Arsenite of lime was quite highly recommended by some a year ago, but the work of the past season has demonstrated that this combination is likely to cause serious foliage injury. Paris green has given similar results. At present lead arsenate is the only poison that we know to be safe for use with lime-sulphur on foliage. There are many forms of lime-sulphur preparations. The above remarks apply only to the concentrated solution. It can be prepared at home or purchased from several manufacturing firms. The home boiled product, if properly prepared, gives practically the same results as the factory boiled.

A good commercial concentrate should test about 33 degrees B. and should be diluted about 1-40. To this should be added lead arsenate at the rate of four to six pounds per 100 gallons, and the spray is ready for use.

In conclusion let me say that I have talked with a large number of growers of Western New York, and feel safe in saying that more than 90 per cent of those who watched the results of the past two seasons will not use Bordeaux mixture for apple scab next year. Bordeaux as a summer spray fo apple scab, we believe, is largely a thing of the past. We would not say that lime-sulphur solution has come to stay. It will stay only until we find a better. It is not perfect and we are not going to rest until those imperfections have been overcome or a more perfect substitute has been found.

The ideal spray would be one which can be effectively applied under all conditions without the slightest possibility of injury to fruit or foliage. This is not an impossibility. We believe it is coming soon.

SUCKING INSECTS AND MITES INJURIOUS TO THE APPLE AND PEAR.

By W. H. Brittain, Provincial Entomologist.

While spraying for biting insects and fungous diseases has, for a number of years, been part of the ordinary routine in practically all commercial orchards, little attention has been paid to the treatment of insects of the sucking type. It is possibly due to this fact, that the damage occasioned by certain of these pests has recently increased, sometimes to an alarming extent, and has caused something like consternation in certain quarters. Numbers of fruit growers who have solved the problem of the control of such troubles as apple scab, budmoth, canker worm, etc., are pessimistic regarding the successful treatment of various sucking insect whose ravages have begun to be recognized in their orchards.

It must be remembered that, with some exceptions, nothing has been done until quite recently to check the in-increase of this class of pests. Even at the present time the use of sprays to control them has not become general and as too often applied they are, unfortunately, little else than a waste of good material. It is therefore not at all suprising that we have periodic outbreaks of various sucking insects and that the loss occasioned by some forms has been steadily increasing from year to year. When the same amount of attention has been paid to the treatment of these pests that has been accorded to that of fungous diseases and biting insects, and when the lesson of care and thoroughness has been well learned, we may expect to see a marked decrease in the injury from this source.

Plant Bugs.

Three species of plant bugs are usually found in orchards in Nova Scotia, viz: the Tarnished Plant Bug (Lygus pratensis), the False Apple Red Bug (Lygidea mendax) and the Green Apple Bug (Lygus communis var. novascotiensis). The first of these is a very general feeder and injures many different cultivated and wild plants. As a fruit pest, however, it is of minor importance in Nova Scotia. The False Apple Red Bug is known elsewhere as a serious pest of the apple, but it has never occured in sufficient numbers in this province to be worthy of any special notice. The Green Apple Bug, however, is one of the most serious enemies of the apple and pear, and undoubtedly the most difficult to control of any with which the fruitgrower has to contend.

The Green Apple Bug.

(*Lygus communis var. novascotiensis Kinght*).

The young insects, or nymphs, of this species are pale or slightly yellowish insects, about 1-25 of an inch long when first hatched. In the third nymphal stage, they become a light green and when full grown they are slightly yellowish about the head and thorax and measure 1-6 of an inch in length. The newly emerged adult is a delicate insect ¼ of an inch in length and very pale in color, which, however, soon deepens until it becomes a combination of light and dark browns. In appearance it is strikingly like the tarnished plant bug (Lygus pratensis) and is frequently mistaken for this species.

Life History and Habits.

The eggs are laid beneath the bark of the apple, pear and quince, and the emergence of the insect from the egg begins shortly before the apple blossoms open in the spring and continues through the blossoming period. The period of greatest emergence corresponds to the time of full bloom of the Bartlett pear, or just as the Gravenstein apples are coming into bloom. The bugs remain in the immature or nymphal form for about one month, when they reach the adult or winged stage.

The young bugs or nymphs are very active in their habits and possess a remarkable ability to hide themselves in inaccessible places. As they increase in size they exhibit an increasing tendency to drop to the ground when disturbed Here they are able to subsist on various weeds and grasses growing beneath the tree until they reach the adult state, whereupon they fly back to feed upon the fruit and to deposit their eggs in the twigs. The nymphs feed freely upon the leaves, stems and blossoms, but fruit is preferred to other food.

The adults are active insects and can fly considerable distances. In feeding they prefer a diet of fruit and that of pears is most attractive to them. Bugs from surrounding apple trees, will fly to the pears in large numbers for the purpose of feeding, though the greater number later return to the apple to deposit their eggs.

Injuries.

Young leaves show the work of the bug in the form of purplish spots which, as the leaf expands, disappear, but perforations through the leaves mark the points of puncture. Badly attacked leaves have a ragged, frayed appearance. The new growth of the current season is often killed by the repeated punctures of large numbers of bugs and lumpy scars mark the points of punctures on the twigs. Blossoms shrivel and die as a result of their attacks and affected apples are scarred and twisted, large numbers dropping to the ground. Injured pears are covered with corky scars and hard flinty kernels extend into the pulp. Plums are frequently injured by flying adults, whose punctures cause a copious exudation of gum from the infested fruit. Taken altogether the damage done by this insect and the elusiveness of its habits, make it the most serious enemy of our fruit growers.

Control.

1. Thoroughly prune all infested trees so that all parts will be readily accessible to the spray.

2. Where the infestation is severe, band with tanglefoot to prevent the reascent of those insects that have fallen to the ground. Likewise the grass and weeds in the orchard must be altogether eradicated, so that nothing is present beneath the tree to serve as food for such insects..

3. Apple trees should be sprayed with nicotine sulphate (Blackleaf 40) just before the blossoms open and again, if necessary, just after they fall. In the case of very light infestations, one spraying before the blossoms without banding, will give satisfactory control if timed correctly and applied with care and thoroughness. To control the pest on pears, it must first of all be destroyed in the near-by apple trees, since much of the damage done to pears is from bugs flying from such trees. If the pear trees are infested by the immature bugs, one spray immediately the blossoms fall is usually sufficient.

4. A very heavy, drenching, driving spray is necessary, Use a drive nozzle and a pressure of at least 200 lbs. Follow up each limb individually and spray it from every angle.

Leaf Hoppers.

Three species of leaf hoppers are commonly found in Nova Scotia orchards viz; the Black Apple-Leaf Hopper (Idiocerus fitchi Van D.) the Rose-leaf Hopper (Empoa rosae Linn.) and the Apple-leaf Hopper (Empoasca mali LeB.) The first of these, though not uncommon, cannot be considered a pest of sufficient seriousness to warrant special treatment.

The other two species resemble each other so closely in appearance, life-history and injuries that they can be conveniently considered together.

The young of the rose-leaf hopper are pale yellow in color, the adult being yellowish white and about 1-8 of an inch in length. Both young and adults of the apple-leaf hopper are pale green. The young run when disturbed, but the adults in addition to the power of flight can jump considerable distance.

Life History and Habits.

Both winter in the egg state, the eggs being laid obliquely in the bark of the twigs, a blister-like swelling marking the spot where one or two eggs are deposited. The eggs hatch in the spring beginning some time after the buds burst, continuing through the blossoming period, and for some time thereafter, in certain seasons. The young insects require from four to five weeks to complete their development, after which summer eggs are laid in the petioles, midribs and larger veins of the leaves. There is a complete second brood of both species in Nova Scotia, the young of this brood taking from three to four weeks to complete their development. The adults of this generation deposit the eggs, which carry the species through the winter.

The chief damage is done to the foliage of nursery stock and to young apple trees, but only in unusually severe cases is it necessary to adopt control measures especially for these insects. The feeding punctures result in the appearance of small white spots on the surface of the leaf. When the insects are numerous these spots run together, giving the infested leaf a blotched appearance. Injury sometimes, though rarely, results from the deposition of the eggs in the twigs, but more often no apparent damage is done in this way.

Control.

The slight amount of damage usually done, will rarely warrant the cost of spraying. Where the Green Apple Bug is present, the spray for this pest will destroy the hoppers. Nicotine sulphate (Blackleaf 40) employed in the usual strength is very effective, and should be applied after all the insects have hatched, but before they reach the winged state.

Plant Lice or Aphids.

Four species of plant lice or aphids are found infesting orchards in Nova Scotia. They are the Green Apple Aphis (Aphis pomi DeG.), the Grain Aphis (Siphocoryne avenae Fabr.) the Rosy Apple Aphis (Aphis sorbi Kalt.) and the Woolly Apple Aphis (Eriosoma lanigera Hausm). The first three of these are leaf feeding species, the fourth feeds upon the bark of the twigs, smaller limbs and occasionally the roots and only rarely attacks the leaves.

The Green Apple Aphis spends its entire life upon the apple. The Grain Aphis and the Rosy Aphis migrate to other plants, the former to various grasses, the latter to species of plantain (Plantago spp.) during the summer, and there spend a portion of their life history. The woolly apple aphis normally spends part of its life on the apple and part on the elm, but a proportion of the species keep breeding continuously on the apple, without alternation of food plants.

The Green Apple Aphis.

(*Aphis pomi DeG.*)

The aphis of this species are small green forms, rarely reaching more than 1-15 of an inch in length. They are more or less pear shaped in form. The eggs are small, black and glistening.

Life History.

The winter is passed in the egg state upon the twigs. Hatching commences about the time that the leaves about the blossom clusters begin to show green, the greater proportion emerging within a week, but continuing in diminishing numbers until the time of blossoming. From 6 to 9 generations are passed on the apple, all but the last being composed entirely of females that give birth to their young alive. The last generation consists of true male and female forms, the latter being responsible for the eggs from which the next year's generation springs. A certain proportion of each summer generation consists of winged forms that spread the species from tree to tree and from orchard to orchard.

Injuries.

The commonest seat of injury from this source is to the tender, succulent shoots. The growth of the twigs is checked and may even be stopped altogether, and some-rapidly growing shoots are curiously curled or twisted as a result of the insect's work. The leaves are curled, but not so severely as in the case of the Rosy Aphis.

In severe cases the developing fruit may be attacked and gnarled and dwarfed as a result of their work. Periodically, an epidemic of Green Aphis may be expected in which serious injury to the fruit will occur, but ordinarily the damage done to the developing fruit early in the season is slight. Since this species passes its life entirely on the apple it may, though comparatively scarce in the spring months, increase to such an extent as to do severe injury to the fruit before picking time.

The Rosy Apple Aphis.

(*Aphis sorbi Kalt.*)

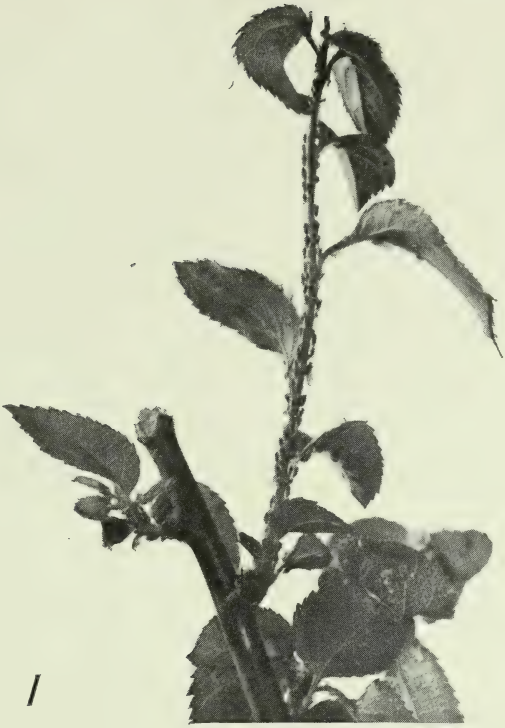
This insect gets its name from its color, the wingless summer forms having a rosy or pinkish tinge. The egg resembles that of the Green Aphis.

Life History.

The first three generations are spent on the apple, the females of the 3rd generations developing into so-called "spring migrants" that fly to plantains (Plantage spp.) where several generations are produced. In the fall the species returns to the apple where the winter eggs are deposited. Females of the first generation are very prolific and give birth to from 100 to 300 young each, and those of the second generation average more than 100 young each. Though the eggs are rarely abundant, it therefore often happens, that these insects soon become very numerous in the orchard.

Injuries.

This species causes much more severe injury to the leaves than the species previously discussed. The insects as they hatch from the eggs, cluster upon the opening bud tips and on the undersides of the unfolding leaves and, as these develop, they curl around the insect after the fashion of a paper cylinder. In feeding these insects show a marked preference



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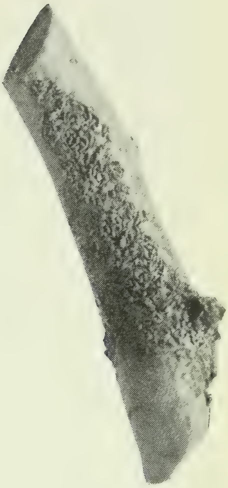

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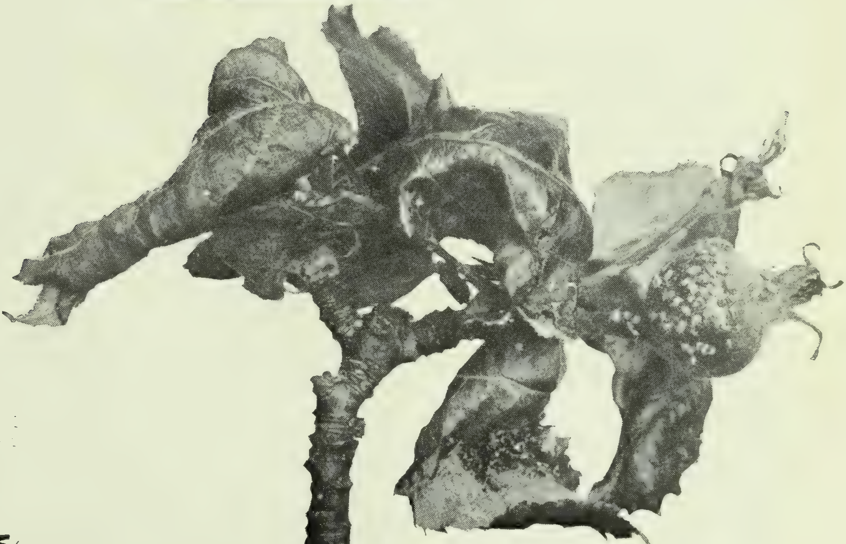

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1. Green Aphids (Aphis pomi Deg.) on Young Apple Shoot. (Original)
2. Eggs of Aphis pomi. (Original).
3. Rosy Aphids (Aphis sorbi) on Apples and Foliage. (Original).

for the fruit clusters, where they swarm on the undersides of the leaves and even on the flower buds and developing fruit. The result is that the fruit is reduced in size to a greater or less extent, forming clusters of so-called "gnarls" hanging from infested trees, for, strange to say, apples that normally drop remain in an undeveloped state upon the tree. The dwarfing of the fruit may be brought about by the injury to the leaves that surround the cluster, but the fruit itself is freely attacked and badly distorted and twisted as a result. The damage is practically all done early in the season, since this species forsakes the apple for its alternate food plant in the 3rd generation.

The Grain Aphis.

(*Siphocoryne avenae Fab.*)

This aphis is frequently mistaken for the Green Aphis but can readily be distinguished from it by its brighter green color and by the bands of darker green upon its abdomen.

Life History.

These insects appear about a week before the preceding species, hatching out from their oval shiny eggs and clustering at the tip of the buds. Only one complete generation is spent on the apple, since a considerable proportion of the second generation and all the third generation, migrate to grasses where the rest of the summer is passed. Like the Rosy Aphis, the egg is deposited by the sexual female upon the apple twigs.

Injuries.

During the past three years this insect has never been observed doing any serious injury to the apple. Though present in fairly large numbers early in the spring of this year, they disappeared before any appreciable damage had been accomplished. On the whole, this insect cannot be considered to be a serious orchard enemy.

The Woolly Apple Aphis.

(*Eriosoma lanigera Hausm*).

Bluish white, cottony patches are frequently noticed upon old wounds or the stubs of limbs, early in the season, or upon the younger growth in late summer or fall. A close examination reveals the fact that these patches are made up of numbers of small reddish-brown aphids, each of which is covered with a white waxy secretion.

Life History.

In Nova Scotia this insect passes four or five generations upon the apple, the last generation hibernating under pieces bark or any available shelter upon the tree. It has been shown however, that normally the winter is passed in the egg state upon the elm, and the first three spring generations are passed upon that plant. The insects of the third generation are migrants that fly to the apple, where three more generations develop. This last generation are also migrants that return to the elm when the sexual forms are produced. Up to the present we have found that the most important source of spring infestation of the apples is from the females that hibernate on the trees.

Injuries.

The Woolly Aphis in Nova Scotia is only rarely responsible for any serious damage to apple trees. Damage to roots, which is the most serious form that the injury takes in some countries, is not common here. Open cankers on the twigs or limbs where the insect is at work, or occasionally gall-like swellings are the principal results of their work.

Control of the Orchard Aphids.

The most effective time to spray for the green, the rosy and the grain aphis is just when the bud tips are showing green, when they will be found clustering at the tips of the buds. Nicotine sulphate (Blackleaf 40) should be used, in the strength of 1 pint to 100 gals. A heavy, drenching, driving spray should be employed and no insects left uncovered with the liquid. The addition of a good spreader such as flour paste, materially improves the effectiveness of the spray.

When not too numerous, the most satisfactory method of treating the woolly aphis is simply to paint over the affected parts with kerosene. If the insect is found to be on the increase a heavy spray with the nicotine solution or kerosene emulsion may be applied late in the season when the insects are on the smaller growth.

Scale Insects.

Scale insects are a group of considerable economic importance in southern countries, where many forms do great damage, but only a few species are worthy of notice here. They are usually quite small insects, scale-like or gall-like in form, or grub-like and clothed with wax. The females are wingless and stationery. The males are usually provided with two transparent wings, but as they are very minute and only live a short time after reaching the adult state, they would never be noticed by the casual observer.

The San Jose Scale is well known, at least by name, in all the fruit growing sections of North America. It has recently been introduced into Nova Scotia, but owing to the active campaign waged against it by the Provincial Department of Agriculture it has never made any headway. A rigid inspection is made of all imported stock, so that further danger from infested localities is provided against.

Other scale insects commonly found are the Scurfy Scale (Chionaspis furfura Fitch and the European Scale (Aspidiotus ostreaeforuris Curtis), but these are kept in check so effectively by their natural enemies that it will rarely be necessary to adopt special control measures against them. The Oyster Shell Scale (Lepidosophes ulmi Linn.) is more common than the other species mentioned and, in orchards that are not regularly sprayed, it is sometimes the cause of some loss.

Oyster Shell Scale.

(*Lepidosophes ulmi Linn.*

The insect gets its name from the shape of its scale, which resembles a diminutive oyster shell, though frequently distorted by overcrowding. The scale is brown in color.

Life History.

The eggs are laid in September and the winter is passed in this state. The eggs are small, oval yellowish bodies, packed closely together under the scale and number, on the average, about 28 for each insect.

A few days after the falling of the apple blossoms the eggs hatch and for a short time the young insects wander actively over the plant, sometimes wandering as far as the fruit. In a short time, however, they settle down, insert their beaks in the bark and proceed to secrete their scales, after which there is no further movement. There is only one brood per year.

Injuries.

The continued sucking of the juices of the plant by thousands of tiny beaks, finally results in the death of the affected part, and where allowed to go unchecked, large limbs may be destroyed. In very rare instances, the whole tree may eventually succumb. Occasionally, the crowding of the insects on the fruit itself is a source of loss.

Control of Scale Insects.

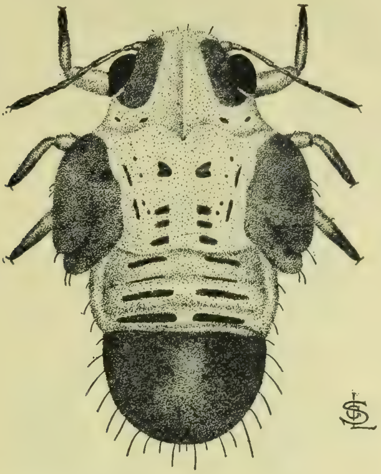
We have seldom found any of the scale insects mentioned making a great deal of headway in orchards that are regularly sprayed for apple scab. If, however, it should become necessary to take special measures, the dormant spray of lime sulphur (commercial wash, about 1-10) should be used, every precaution being taken to cover each insect. If the lime sulphur spray ordinarily applied just after the blossoms fall, be deferred for a few days, it will catch the young of the Oyster Shell Scale as they emerge.

Sodium Sulphide (Soluble Sulphur) and Barium Sulphide (B.T.S.), recently devised dry substitutes for lime sulphur, are also used for controlling scale insects.

The Pear Psylla.

(*Psylla pyricola Forster*).

The adults of this insect resemble a much reduced cicada in appearance, being only one tenth of an inch in length. In color they are a dark reddish brown, with abdomen banded with black. The wings are transparent, relatively large in proportion to the insects' size and slanted roof-like over the body when it is at rest. The newly hatched young are very tiny, and in fact can scarcely be seen by the naked eye. The appearance of the last stage nymph is shown in the figure.



Fullgrown nymph of Pear Psylla.

Life History.

The winter is passed in the adult state, the over-wintering adults being smaller and otherwise different in appearance from the summer forms. They conceal themselves in cracks and crevices of the bark, or under leaves and rubbish on the ground. They come out early in spring, with the first warm days and begin to lay their tiny, yellowish eggs upon the twigs. The hatching of the eggs extends over a considerable period, and is largely dependent upon weather conditions, but is usually almost finished by the time the blossom petals fall. The favorite place for the young to feed is the axils of the leaves, but when crowded they may spread out over the petioles and undersides of the leaves. The young insects pass through five immature or nymphal stages before they reach the adult or winged form, the females of which lay the eggs for the next brood. These eggs are laid along the midrib on the underside of the leaf. There are three or four broods a year in Nova Scotia.

Injuries.

Though this insect has been found in several localities throughout the Annapolis Valley, we have never known it to become numerous enough to cause serious damage as yet. In localities where this pest is known it occurs as a more or less periodic pest like the Green Aphis and many other insects, but sometimes it is the cause of great loss. The leaves become brownish or black, wither up and drop to the ground. The fruit is dwarfed and caused to fall prematurely. In severe infestations the leaves and fruit of infested trees are covered with a sweet sticky substance called honey-dew, which is secreted by the insect. A sooty fungus growing on the honey-dew, gives the tree a very unsightly appearance.

Control.

Scraping off the rough bark from the trees and destroying the rubbish at their base is recommended. A late fall or early spring spray with nicotine sulphate, (Blackleaf 40) when the insects are in their winter quarters and sluggish, is given. It appears, however, that the most satisfactory sometimes method is to give a very thorough spray with this material, shortly after the blossom petals fall. If the work is well done and the greater part of the first brood destroyed, little further trouble should be experienced.

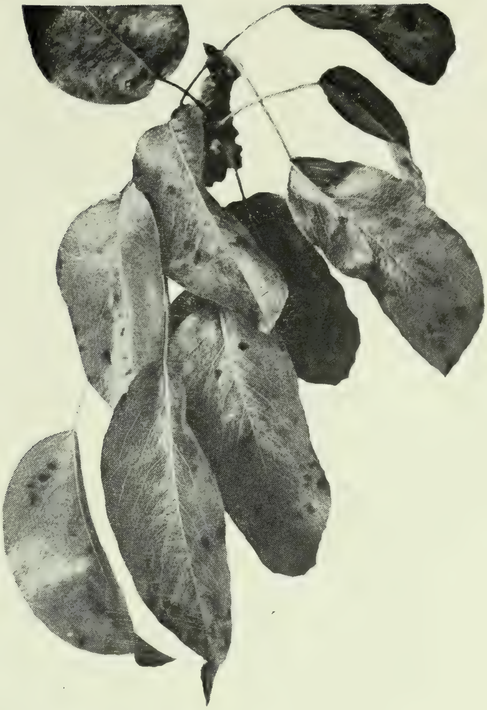
APPLE AND PEAR MITES.

Mites are not, strictly speaking, insects, being in fact more closely related to spiders. They are provided with four pairs of legs, whereas insects only have three pairs. Since, however, the creatures feed in a similar manner to sucking insects, they may appropriately be considered at this point.

The Pear-leaf Blister Mite.

(*Eriophyes pyri Pgst.*)

These mites are too small to be seen by the unaided eye, being only 1-125 of an inch in length, but their work on both the apple and pear is conspicuous. The winter is passed by the mites under the bud scales, but as soon as the buds burst they leave their winter quarters and begin to burrow beneath the skin of the lower surface of the leaves. The result of this work is the formation of a blister-like gall, which on the pear is at first green, and later red in color. On the apple the blisters are yellowish and greenish and rarely take on the red coloration, characteristic of affected pear leaves. Severe injury may result in permature falling of the leaves. The young fruit is sometimes attacked and, in bad cases, stunted or deformed.



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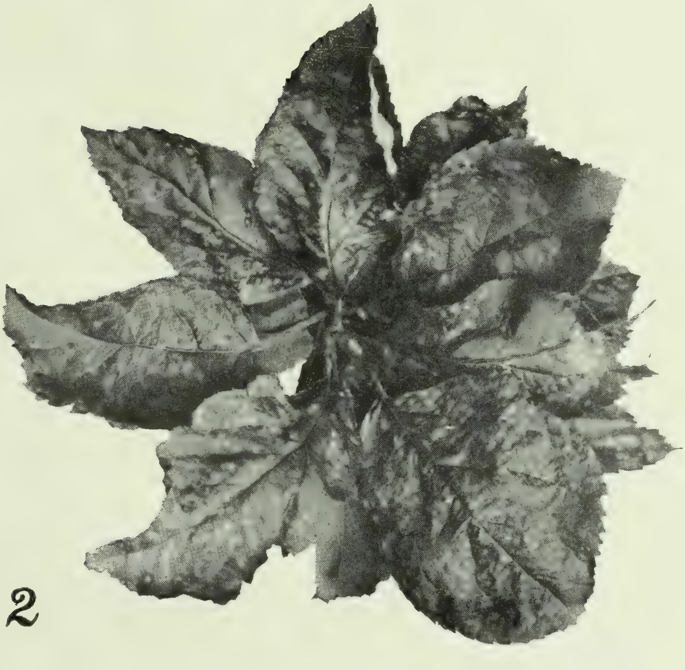

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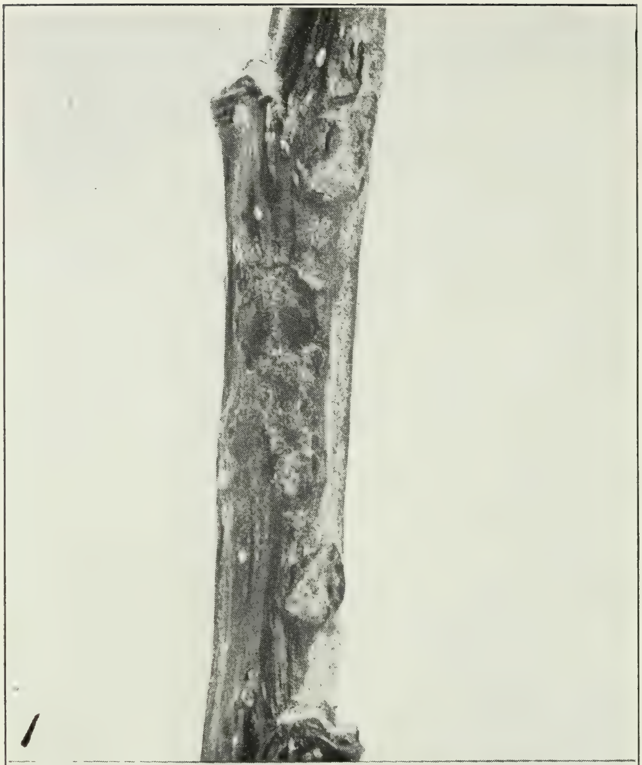
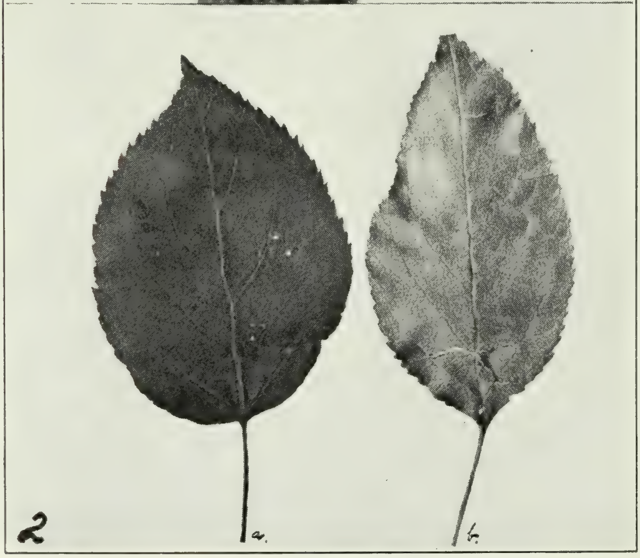
1. Pear Leaves Injured by Blister-mite (Eriophyes pyri Pgst.) Original.
2. Apple Leaves Injured by Blister-mite (Eriophyes pyri Pgst.) Original.





1. Hibernating incrustations of Apple Leaf-mite (Phyllocoptes Schlectendali) in Apple Twig.

2. a. Healthy Apple Leaf.

   b. Leaf Infested with Apple Leaf Mite.

Several generations are produced throughout the summer. The eggs are deposited within the gall and there the mite remains until mature, when it leaves the gall through a tiny opening on the under side, to form a new blister elsewhere.

Control.

The dormant spray of lime sulphur 1-10 (commercial lime sulphur testing 320 Beaume) applied in the autumn after the leaves fall, or in the spring before growth starts is a satisfactory control.

Apple Leaf Mites.

(*Phyllocoptes schlectendali Nal. & others*)

A conspicuous whitening or sulvering of the leaves of the apple is noticed in more or less abundance each year. Some seasons, however, it is very much more common than others. Sometimes the trouble may be confined to a single limb, in other cases the whole tree may be affected. The leaves may be a uniform milky white, or they may exhibit a decided metallic lustre, according to variety. Sometimes too, the leaves are simply spotted or blotched with the whitish or silvery coloration.

If examined under a lens such leaves may be seen to be covered with numbers of tiny mites, whose innumerable tiny feeding punctures have created an air cushion between the skin of the leaf and the underlying cells, and hence their white or silvery appearance. This trouble is very likely to be confused with the fungus, Silver Leaf, (Stereum purpureum), the symptoms being almost identical.

It does not appear that these mites result in any serious damage to the tree, but in case most of them are quite easily controlled by the ordinary summer spray of lime sulphur. Where this is not satisfactory, a spray of nicotine sulphate, 1 pint to 100 gals. may be used. Other species, e. g. the Red Spider (Tetranychus bimaculatus) are controlled by a spray of flour paste, 4 gals. to 40 water. This particular mite is never sufficiently numerous in our orchards to warrant special treatment.

The Apple Maggot

(*Rhagoletis pomonella Walsh*)

By W. H. Brittain, Provincial Entomologist.

This pest is not generally distributed throughout the Annapolis Valley, but destructive outbreaks have been found in the vicinity of Windsor and Digby, and slight infestation about Middleton. Traces of the insect can be found over a much wider range, but it has only become numerous enough to win notice in the places indicated. In some cases it has been responsible for the loss of the entire crop of susceptible varieties

The adult flies resemble a house fly somewhat in appearance, but the transparent wings are conspicuously crossed with black bands. The larva is a stout cream colored maggot and is devoid of head or legs. The pupa is about the size of a wheat grain and almost the same color.

The flies begin to appear about the middle of July, but the time varies greatly with the locality and the season.

The eggs are not laid for some time after the fly emerges, the time depending on the temperature. Our observations show that as long a period as two weeks may elapse between emergence and egg-laying, though the period may be considerably shorter. During this period the fly feeds upon the gum and juices on the surface of the fruit, and seems to have the power of making use of solid substances by means of saliva ejected from the mouth. The solid substances are dissolved in the saliva and then sucked up by the fly. The foregoing facts are important to keep in mind, since on them our control measures are based.

The eggs are deposited beneath the skin, within the pulp of the apple and hatch in about six days. The time spent in the larval state varies greatly according to variety, temperature, etc. Larvae keep emerging from the apple during the latter part of August, September and October, and many are caught undeveloped by the frost in November. The work of the maggot causes the apples to fall prematurely and we have never known of a case in which the larva emerged from the fruit while it was still on the tree. The larvae enter the soil for a short distance, where they transform to pupae, in which state the winter is passed. Strange to say a large proportion of the flies do not emerge the next season, but pass another year in the pupal state before emerging.

Work of the Larvae in the Fruit.

Immediately upon hatching the maggot begins to work in the pulp of the apple. Although there is no true head, there are two strong chitinous hooks on either side of the mouth, with which the maggot rasps the cells of the apple pulp. The liberated juices are then absorbed and the dead cells turn dark, forming the brown tunnels. In the case of the apples that are still growing when the eggs are laid, the work is later indicated by corky strands extending through the pulp, as the tunnels are quick to heal over after being made.

As the fruit begins to ripen the maggots grow rapidly and extend their tunnels in every direction, until frequently the fruit becomes completely honey-combed by their work. In many cases, barrels of apparently sound fruit have been shipped in entire ignorance of the fact that they contained maggots, which, when they reached their destination, were reduced to a rotten, spongy mass. This was due to the fact that the apples had commenced to ripen in transit, thus accelerating the development. Needless to say fruit infested with maggots is quite useless for marketing purposes. Even the evaporators refused fruit from orchards known to be infested.

The work of the apple maggot is frequently confused with that of the codling moth or apple worm, though in reality there is little resemblance. The codling moth usually enters by the blossom end and bores straight downwards to the core, around which it feeds, finally emerging by means of a tunnel straight out at the cheek of the apple. It does not bore through and through the pulp of the apple making the brown tunnels so characteristic of the maggot, but confines itself largely to the region of the core.

The resemblance of the maggot injury to the so-called "bitter pit" disease is more striking. This disease is characterized by brown corky strands extending through the pulp of the apple, and usually by brown sunken areas on the surface. There are, of course, no real tunnels present, nor any sign of punctures in the fruit, as is the case when the maggot is actually responsible for the work.

Control.

The method formerly recommended for the control of this pest was the prompt picking up and destruction of the fallen fruit. This method, if persisted in, will eventually result in the eradication of the pest, but it is a laborious and tedious process.

We have had very good success from the use of poisoned sprays, applied as soon as the flies begin to appear., which should be repeated if the spray should be washed off by heavy rains. Either arsenate of lead or arsenate of lime are satisfactory, but the latter, if used alone, causes severe foliage injury and should only be used in conjunction with lime sulphur or Bordeaux.

In order to determine the time when the flies begin to emerge, a good plan is to place a large number of maggot infested apples in a barrel with a few inches of earth in the bottom, cover the top of the barrel with cheese cloth and, as soon as the first flies appear the next July, apply the spray. Good results should be obtained by simply deferring the last summer spray, (usually applied when the apples are about the size of acorns) for an extra week or so, particularly if flour paste is added as a sticker.

THE BUFFALO TREE-HOPPER.

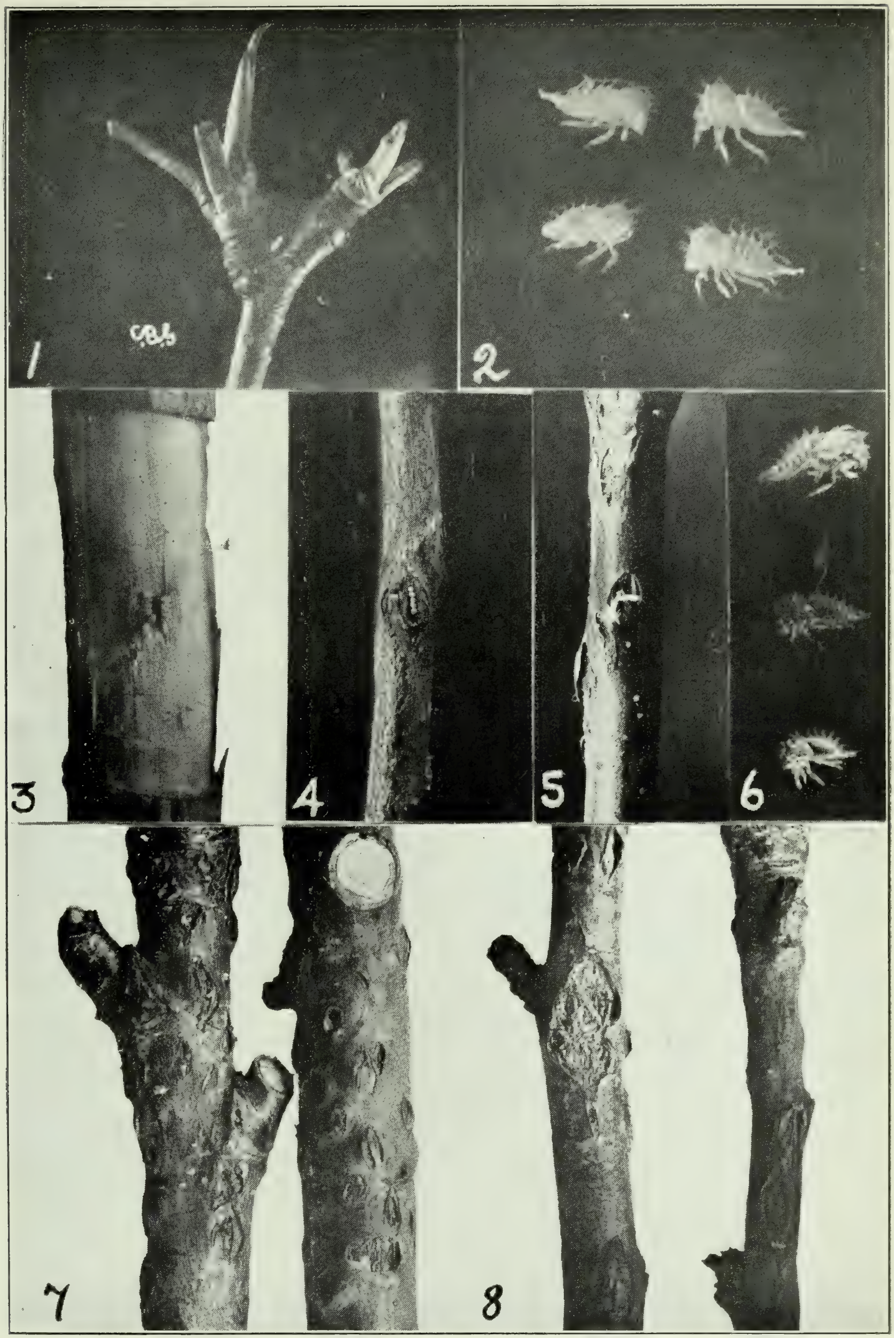
(*Ceresa bubalus Fab.*)

By W. H. Brittain, Provincial Entomologist.

A number of tree hoppers are known to deposit their eggs in the twigs of the apple and pear, but the buffalo tree-hopper is the only species that causes any particular harm by so doing. This is a peculiar triangular insect with the front angles of the thorax produced into horn-like projections, which gives to the insect an appearance suggestive of the name it bears. The nymphs are a brownish grey in color, triangular in shape and the dorsal surface is beset with strong spines.

Injuries.

The damage is done by the female bug in depositing her eggs in the twigs and smaller limbs. Two slightly crossed incisions are made close together and into these incisions are inserted numbers of eggs, which lie in a double row beneath the bark. As the wound thus made begins to heal, the scars enlarge with the growth of the limbs, which then present a very unsightly appearance. Young fruit trees growing in sod, are frequently severely checked in this way, and even the young growth of older trees may suffer to some extent.



1. Eggs of Ceresa Taurina Fitch, in Place. (Original.)
2. Nymphal Skins of C. Taurina. (Original.)
3. Bark Removed, showing Eggs of Ceresa Bubalus Fabr. (Original).
4. Eggs Forced to Surface of Bark Through Rapid Growth of Twig.
5. Nymph of C. Bubalus Emerging from Egg. (Original.)
6. Nymphal Skins of C. Bubalus. (Original.)
7. Fresh Punctures made by C. Bubalus. (Original.)
8. Old Punctures. (Original.)

Life History.

Only the egg state is spent in the apple and pear, the nymphs feeding upon certain weeds that grow in the orchard but chiefly upon the sheep sorrel (Rumex acetosella). The insects reach maturity through the latter half of August and September and shortly afterwards the eggs are laid. They remain in the egg state during the winter months, hatching in the spring or early summer into the strongly spined nymphs that drop to the ground, seek their food plants and continue feeding throughout the summer.

It was noted that they preferred to feed on the tender growth of sorrel, that developed under the shade of tall grass and did not care for situations exposed to the light where the growth would naturally be more woody. This explains the fact that the damage from these insects is done to orchards wholly or partially in sod.

Control.

The control of the pest consists in the destruction of the weeds upon which the nymphs feed.

THE BITING INSECT OF THE APPLE IN NOVA SCOTIA.

By G. E. Sanders, Field Officer in Charge, Dominion Entomological Laboratory, Annapolis Royal, N. S.

The biting insects of the apple in Nova Scotia, are really divided into three groups: (1) Those which cause serious loss each year in orchards not thoroughly sprayed, and which are not influenced to any great extent by parasites or other natural means of control; (2) those which are capable of doing very serious injury, but are periodically controlled and brought almost to extermination by their parasites and (3) those which are of secondary economic importance which may or may not be more or less controlled by parasites.

Permanent, Serious Pests.

In this first group are the budmoths, the fruit worms and the Codling Moth.

The Budmoths. At present four species of budmoth are known, which attack the apple in Nova Scotia. The Eye Spotted Budmoth, *Spilonota* (Tmetocera) *ocellana, Schiff*, is the most common, far outnumbering all the other species taken together. The next most common species is the Oblique Banded Leaf Roller, *Archips rosaceana*, Horr, which is found in greater or less numbers throughout the province, but only occasionally, in small localities, becoming a serious pest for a year or so, and then disappearing. The third species *Olethreutes consanguinana*, is distributed throughout the western end of the province, but has been found attacking apples only about Kentville, where in some orchards it is doing an immense amount of damage, apparently twenty-five per cent of the budmoth injury being done by this species. In the fiftieth Annual Report of the Fruit Growers Association of Nova Scotia, *Olethreutes consanguinana* was recorded for the first time by the author as feeding on the apple. It was then referred to as *O. frigidana*. The fourth species, the Lesser Budmoth, *Recurvaria nanella*, Hubn, is a native of Europe, which was last year recorded for the first time from Nova Scotia. The extent to which this insect damages the apple has not been accurately determined, nor has its distribution been carefully worked out but it has been taken from both ends of the Annapolis Valley. Being an imported insect, there is a possibility of it becoming a serious pest; already E. W. Scott and J. H. Payne in Bul. 113 of the U. S. Department of Agriculture have recorded it as infesting 45 per cent of the buds in an apple orchard in Benton Harbor, Michigan. This insect will receive careful attention in Nova Scotia during the next few years.

General Life Histories.

All four of our species of budmoths have somewhat similar life histories. They all pass the winter as larvae in hibernating cocoons; they all emerge as the buds begin to swell in the spring, and bore into the opening tips; they all feed in the same manner until the blossoms open, usually under cover of a mass of dead and partly eaten leaves. The date of pupation varies, some pupating during, or immediately after, the blossoming period, some three or four weeks later. All pupate among the leaves on the trees. In all species the eggs are deposited on the leaves, *A. rosaceana* depositing its eggs in a mass, and others depositing them singly. In *R. nanella*, the young larva acts as a true leaf miner in the autumn; in *O. consanguinan* and *S. ocellana* the larvae act as semi-leafminers always feeding under cover, but where possible, tying two leaves together, or the leaf to a limb or an apple, often disfiguring the fruit by feeding on it. In *A. rosaceana*, the larvae feed on the leaf rather than in it. All species are single brooded in Nova Scotia, and leave the leaves on which they are feeding to form their winter hibernating cases with the first frosts, to pass the winter as partly grown larvae.

Extent of Injury.

Spring Injury. There has been much controversy in regard to the extent of the injury done by the budmoth entering the bud in the spring. The boring of a budmoth larva into a bud very seldom prevents blossoming. Actual counts show only 35 per cent of the blossoms in the infested clusters to be noticeably injured; the actual damage done, however, exceeds this. Counts on Wageners in 1913 and 1915 show the set in blossom clusters infested, to be reduced 74.7 and 79.4 per cent respectively, so by counting the number of buds infested by budmoth in an orchard, and then reckoning that the percentage of reduction in crop will amount to about three quarters of that figure, one can estimate fairly accurately the amount of damage the budmoths are doing in an orchard.

Fall Injury. The damage that the budmoths do to the foliage in the fall is negligible, but the habit of two species in tying the leaf up to the apple and marring the surface, making it fit usually for a No. 3 or a cull, often causes serious loss. Usually for every ten per cent of the buds damaged by budmoth in the spring, three per cent of the picked fruit will be marred by the budmoth tying up the leaf to it and feeding off the surface of the fruit.

Extent of Damage in Nova Scotia.

The highest percentage of infestation recorded in the buds, in 1915, was in the Early Williams variety, 96.4 per cent of the buds in one plot being infested. The average infestation in unsprayed orchards for all varieties, runs about 40 per cent; in such an orchard about 12 per cent of the apples would have leaves tied to them.

Varieties which have crinkly twigs, such as Wagener, Ribston, Pippin, Nonpareil, Early Williams, etc., are most invariably more heavily infested than clean limbed varieties such as Golden Russet, N. Spy and Ben Davis. This is due to the crinkly twigged varieties offering better protection to the cocoon in which the half-grown larvae hibernate.

Controls.

It has for several years been recognized that the best time to spray for the control of the budmoth, is after the leaves open, and before the blossoms appear. The semi-dormant spray with lead arsenate, for some time recommend ed, has been proved almost worthless in budmoth control in the experiments conducted in R. S. Eaton's orchard in 1912-13, a spray applied about four days before the blossoms opened having given the best results in that experiment. In 1915, experiments were carried on in S. B. Chute's orchard to determine the value of the two sprays before blossoming, one when the leaves are the size of a ten cent piece and the other immediately before blossoming, as compared with one spray about four days before the blossoms opened. The results show that one spray five days before blossoming, followed by two after the blossoms fall, killed 51 per cent of the budmoths, which normally became adults, while the two sprays before blossoming killed 75 per cent.

In an experiment conducted in the George Hoyt orchard, Annapolis, to compare the new Friend Drive nozzle with the Friend Calyx nozzle in budmoth control, the two plots received four sprays, each with the same kind of spray, 2 lbs. paste lead arsenate, 1 gal. lime sulphur solution to

40 gallons. Where the Calyx nozzle, which throws a mist spray very similar to the "misty" and "whirlpool" nozzles, was used, 84 per cent of the budmoths which would otherwise reach maturity were killed. Where the Drive nozzle was used 94 per cent of the budmoths were killed.

The recommendations for budmoth control are, 5 to 7 lbs. arsenate of lead, or 2 lbs. arsenate of lime to 100 gals. of water, applied when the leaves are the size of a ten-cent piece, and again when the blossom buds, are showing pink with a drive nozzle, and immediately after the blossom falls, with either a "calyx" or "drive" nozzle. The spray two weeks after blossoming, has very little effect in budmoth control.

The Fruit Worms, or Apple Worms.

The fruit worms present in Nova Scotia probably number a dozen species, belonging to the *Xylina*, *Calocampa* and *Scoplesoma*. The life history, and damage done by each species is very similar. One species, *Xylina bethunei G. and R.* is the most common, far outnumbering all of the other species combined, and its life history is, in a general way, similar to that of all species of fruit worms so far studied in Nova Scotia.

Life History of X. bethunei.

The adult moth emerges in September and early October, flies until winter, hibernates in rubbish, in old fences, grass etc., and is one of the first moths to be found on the wing in the spring, usually being found flying early in April. About one month after its emergence in the spring, it begins depositing its eggs on the apple-tree. The eggs are deposited singly, about one inch from the tip, on the under side of the outer limbs. The period of the egg deposition covers the Month of May. Eighteen days after the egg is deposited the larva emerges and begins to feed on the leaves. The greatest number of larvae emerge about the time the Gravenstein buds begin to show pink. For the first three weeks of its existence, or until it is in the third instar, the larva feeds on leaves and blossoms. At the beginning of the third instar it forsakes leaves almost entirely and feeds on the fruit, eating holes in the sides of the young apples, usually biting into a new apple for each meal, so that a single larva may do an enormous amount of damage in one season. In all, the larvae moult five times and begin to pupate about July 12th. Pupation continues until about August 5th. For a week or so before pupation, the larvae revert to their early feeding habits, eating as much, if not more, of the leaves than the fruit.

The pupa is formed in a very thin silken web, one or two inches below the surface of the earth. The pupal stage lasts about two months, the first adults emerginp about September 15th.

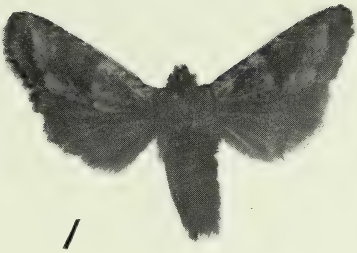
General Description.

In general, the adults of the fruit worms are strong flying, somewhat sharp winged moths, from 1.25 to 1.5 inches across the extended wings. The eggs are conical, ribbed vertically, with a small depression on the top. The larvae are for the most part green in the early stages, sometimes faintly marked with white. In *X. bethunei*, the sixth stage larvae are slaty grey. In the Calocampids, the sixth stage larvae are heavily striped with brown; in some of the Xylinids the final stage of the larvae is greenish white with white markings.

Injury.

The fruit worm larva during the first three weeks of its existence feeds on leaves and blossoms, eating proportionately more surface for a meal than later when it is feeding on the fruit. During this period the damage to the leaves is negligible, but the damage to the blossoms is quite extensive, as the young larvae have been observed eating the pistils, stamens and corolla, but owing to the number uf false blossoms always present, the actual percentage of damage cannot be determined.

When apples are a little thicker than a lead pencil, the third stage larvae begin feeding on them, eating small regular holes in the sides, consuming a large quantity of inner pulp in proportion to the surface eaten. As a rule a fresh apple is eaten into for each meal. In cases where the fruit worm eats through the outer pulp, or what is technically known as the receptacles of the apples, and in to the core, serious malformation of the fruit usually results. In cases where the injury is confined to the outer pulp, the injury heals over to form a somewhat regular roughened area with very little, or no malformation. It has been found by actual count that 72 per cent of the apples eaten by the fruit worms in the spring, drop as a result of the injury; thus, roughly speaking, for every three apples found in picked fruit, showing fruit work injury, seven have already dropped to the ground as n result of the injury. Of the picked fruit,



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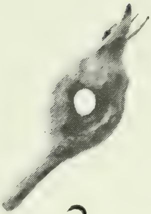

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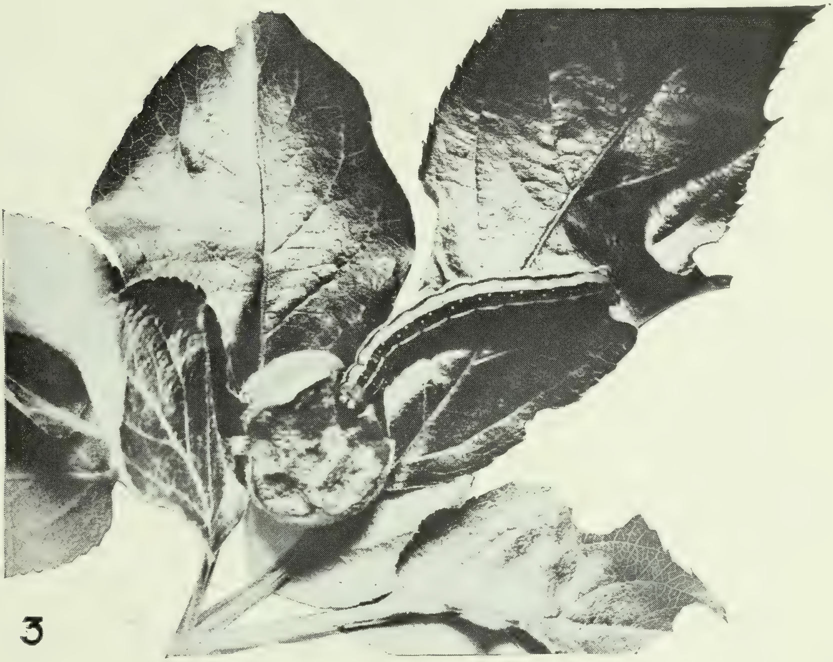

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1. Fruit Worm adult. Xylina bethunei.
2. Apple set showing fresh work of fruit worm larvae.
3. Larva of fruit worm (Calocampa nupera) feeding on apple.

which was No. 1 and No. 2 in size and showed no defect excepting fruit worm injury, 78 per cent were thrown into No. 3's and culls, in an observation to determine the actual injury.

Distribution in Nova Scotia.

Although fruit worms vary slightly in number from year to year, they are, on the whole, fairly constant and evenly distributed in every locality in Nova Scotia where apples are grown. An observation carried on in one locality, with the idea of determining the amount of damage done in various orchards, showed the most sheltered orchard to have 8.2 of the picked fruit injured by fruit worms, while in the most exposed orchards, only eight tenths of one per cent of the picked fruit, showed fruit worm injury. Further observation showed that the percentage of fruit worms varied directly with the sheltered location of the orchard. This is no more than one would expect from studying the life history of the insects. They are very active, strong flying moths and are on the wing for a month and a half in the fall, and one month in the spring before they deposit their eggs, and one could hardly expect them to be as numerous in the exposed and wind swept orchards as in the more sheltered ones, where they would be blown in and would not afterwards be blown out.

Controls.

From following the life history of the fruit worm, it can easily be seen that the time to spray for it is when in its earliest stages, and when it is eating the greatest amount of surface in proportion to the amount of food consumed. Actual experiment proves this to be the case, and the two sprays, one immediately before the blossoms, and one immediately after, gave a reduction in injury of 65 per cent. The spray applied from two weeks to ten days after the blossoms, gave no reduction in injury for the year in which it was applied, but gave a slight reduction the following year, showing that it poisoned the fruit worm after it had done its damage for the year, probably when it was feeding on leaves just before entering the pupal stage.

Carnivorous Habits.

During the season of 1913, while collecting the larvae of *X. bethunei* in the field, it was found that the fifth and sixth stage larvae, ordinarily, when they find the cocoons of the common Tent Caterpillars, *Malacosoma disstria* and *M. americana*, gnaw their way in through the cocoon and feed on the pupa contained. In 1913, 34.82 per cent of the *M. disstria* cocoons collected on apple, on July 12 and 13, were found to be destroyed by *X. bethunei*. In 1914, the cold weather retarded the Tent Caterpillars more than the Fruit Worms, which pupated at about the same time as the Tent Caterpillars, so only 5.99 per cent of the tents were destroyed by them in that season.

The Codling Moth.

The Codling Moth is not nearly so serious a pest in Nova Scotia orchards as it is in some localities which have a longer summer. Again, the high percentage of sprayed orchards has reduced the pest greatly even in orchards which have never been sprayed. In districts outside the Annapolis Valley, where thorough spraying is not practiced in any considerable number of orchards, occasionally thirty, forty or even fifty per cent of the apples may be found infested by codling moth, while in the Valley it is rare even to find an unsprayed orchard which will give over five per cent codling moth injury, while in well sprayed orchards it is not rare to count over two thousand apples and find only one of them wormy.

Life History.

The codling moth passes the winter as a full grown larva in a small cocoon concealed under the bark or in crevices about fruit houses. The pupa is formed in this cocoon in the spring and the first adult moth appears about the time the blossoms begin to open. The emergence of the adult is spread over a very large period in Nova Scotia, and as far as can be determined there is only one brood in the Province, but being spread over such a period we get all of the types of injury caused by the first and second broods elsewhere, and we also find the larvae controlled to a certain extent by all of the spring sprays.

The egg is deposited singly on either the leaf or the apple, and about the time the blossoms fall the young larvae begin to emerge. As a rule the larvae feed first on the leaf, and then proceed to the apple, boring in either from the blossom end or the side, so causing the familiar wormy apple.

During September and October, the larvae leave the apples and form their winter cocoons.

Controls.

The recognized control is of course arsenical sprays as recommended by the spray calendar. Experiments have shown that the spray applied immediately after the blossoms will destroy 89.2 per cent of the larvae, while the spray applied immediately before the blossoms controls 71.3 per cent and the spray two weeks after the blossoms controls 65.5 per cent. Where all three sprays were used 92.2 per cent were destroyed.

Periodic Pests.

In the second group we have three sets of leaf eating insects which are causing most noticeable damage where present, and while they very rarely, if ever, do as much damage in Nova Scotia in a single year as is caused by either the budmoths of the fruit worms, yet their presence causes more comment and suggestions in regard to insect legislation than is ever caused by the more injurious, but less noticeable budmoth.

This group in Nova Scotia consists of the canker worm, the tent caterpillar and the tussock moth.

The Canker Worm.

The canker worm in Nova Scotia presents a most interesting problem when considered from the viewpoint of natural outbreak or natural control. At no time during the past six years has the Annapolis Valley been free from canker worm outbreaks. It has been increasing in one locality and decreasing in another throughout the period. At the present time a number of orchards east of Wolfville are very seriously infested, a number of small infestations are running between Bridgetown and Middleton, and outside these two districts there are a few outbreaks, particularly two on oak, one at Bear River and one near Annapolis, making probably more canker worms in the Valley than there have been for years.

Life History.

The most common species in Nova Scotia is the fall canker worm, *Alsophila pometaria Har.* This species passes the winter in the egg stage, the eggs being deposited in regular flat clusters, one one hundred or more, on the branches of the apple, oak and other food plants. Three or four days before the apple blossoms open, the young larvae emerge and begin feeding on the leaves. About the last of June they finish feeding and drop to the ground, burrowing about an inch down in the soil to pupate. About Nov. 1st the adults emerge. The males, small grey moths, may be seen flying about the trunks of the apple and oak trees; the females, small wingless gray slugs, at the same time may be crawling up the trunk of the trees to deposit their eggs on the branches.

Remedies.

The very best remedy, and one that is sure, is to band the trees about Oct. 25th, with a three inch band of tanglefoot. One pound of commercial tree tanglefoot will band about eight ordinary sized trees. Tree tanglefoot may be made at home by boiling together 9 lbs. of resin, 7 lbs. of castor oil and ½ lb. of paraffin wax. If too soft, add more resin; if too hard add more oil.

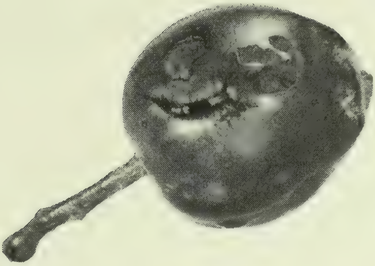
Thorough spraying in the spring will control canker worm. To get the best results, the spray should be applied before the blossoms open, when the caterpillars are young. After the canker worm larva is one third grown, it is a very hard insect to kill and so the best results cannot be expected from spraying for them after the blossoms fall.

Tent Caterpillars.

There are two species uf tent caterpillars, the forest tent, *Malacosoma disstria*, and the American or orchard tent, *M. americana*, in Nova Scotia. Both species feed on forest and shade trees as well as on the apple.

Life History.

Both species pass the winter in the egg stage, the eggs being deposited in rings about the small twigs of the tree. As soon as the first leaves appear the young caterpillars emerge and feed on the leaves as they grow. The forest tent has a row of white dots down the back, while the American tent has a white strip down the back. Both are hairy caterpillars. The American tent forms a large conspicuous web in the crotch of a tree, while the forest tent forms no noticeable web, but collects in large clusters on the trunk of the tree when not feeding. During June, they spin up cocoons and pupate among the leaves on the trees or in any other convenient place. In mid-July the adults emerge and deposit the eggs for next year's brood.



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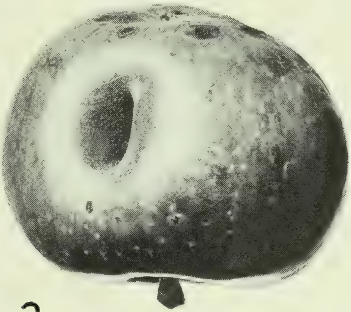

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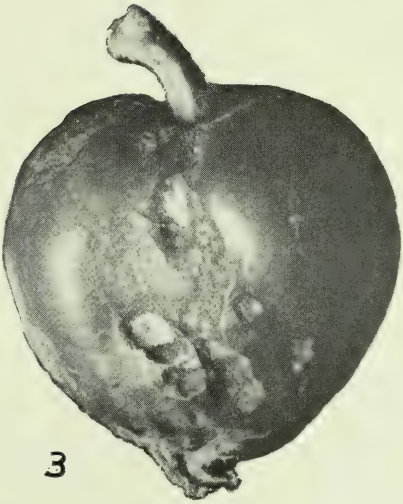

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1. Tussock Moth larva eating surface of apple.
2. Apple at picking time that has been injured by fruit worm in early spring.
3. Tussock Moth injury calloused over. Note unsightly appearance.

Remedies.

The best remedy for the tents is, through spraying with arsenicals when the leaves are about the size of a ten cent piece. Cutting off the branches bearing the webs, is often practiced, but it is more wasteful and less efficient than thorough spraying.

The Tussock Moth.

In 1907, the Annapolis Valley was visited by a very serious outbreak of Tussock Moth, which not only partially defoliated many orchards in mid-July, but by their nibbling at the fruit rendered worthless the majority of the apples in many orchards. In 1910 and 1911 another outbreak occurred which did an immense amount of damage to the shade trees of Halifax, but did very little damage to the Annapolis Valley. In 1915 a small amount of damage was done to a few orchards in the west end of the Valley and in 1916, this outbreak increasing, has rendered worthless from ten to twenty per cent of the crop of apples in many orchards. Next year, 1917, we may look for an immense amount of damage to be done by the tussock moth throughout the west end of the Valley and in some localities in the eastern end of the Valley.

The most common species in Nova Scotia is the White Marked Tussock Moth, *Hemerocampa leucostigma.*

Life History.

The winter is passed in the egg stage, an irregular cluster of eggs covered with white froth on a dead leaf among the branches. During the last week of June the larvae emerge and for the first two weeks of their existence they feed entirely on leaves, later feeding on leaves or apples, eating shallow irregular shannels in the apples, rendering them fit only for No. 3's or culls. The larvae may be identified with certainty by two pencils or brushes of black hairs projecting forward from each side of the head, and one projecting backwards from the hinder end of the body and by four short tufts of white hairs placed in a row on the back. In August the larva pupated in a loosely built cocoon in which one or more dead leaves are included among the fruit spurs. In September the adults emerge; the males, small brownish grey winged moths; the females, wingless slugs which deposit their eggs in a cluster on the old pupa case and dead leaves of the cocoon.

Remedies.

Hand picking of the egg masses when the trees are bare during the winter is more or less practicable, depending on the size of the tree and whether it is open or thick. The best remedy is to use an arsenical poison in the last summer spray, that is, the one applied during the last days of June or the first days of July. This will poison the larvae when they are still young and feeding on leaves entirely, and so is the most efficient remedy for them.

Less Important Insects of the Apple.

In this third group we have a number of insects which cause frequent inquiries but which are of slight importance, economically, to the apple industry as a whole.

The Yellow Necked Caterpillar.

Frequently in late summer a few limbs or young trees in an orchard will be found defoliated by a cluster of large greenish striped caterpillars. The yellow thoracic shield, looking like a yellow collar, and the habit of the larvae of pointing both ends of the body up, identify this as the yellow necked caterpillar, *Datana ministra.*

In bad infestations, spraying would prove practicable, but in six years' experience in Nova Scotia, only scattering isolated clusters have been found and by all odds the most economical treatment is to pick off and destroy them when found.

The Red Humped Caterpillar.

The Red-humped Caterpillar, *Schizura concinna*, is very similar to the last in almost every detail. The red humped caterpillar is about an inch long, spiny, reddish brown in color, with a red hump or saddle across the back. They are found occasionally in clusters, stripping single limbs, but never doing extensive damage. Like the yellow necks, they are pretty well controlled by their natural enemies, and where found in noticeable numbers, hand picking is the most efficient remedy.

The Fall Webworm.

The fall webworm, *Hyphantria cunea*, is found now very commonly in the pastures and orchards of Nova Scotia. The fall webworm attracts much attention during August, forming large webs over the limbs on which it feeds, and is frequently mistaken for the tent caterpillar (American), which forms a somewhat similar web two months earlier in the season.

The Fall Webworm is very thoroughly controlled by parasites, infestations running for three or four years until the parasites become numerous, when they are practically exterminated for a number of years. They begin feeding on the apple a little too late to be influenced by the regular sprays, and the most economical method of controlling them would be to pick the clusters of larvae from the trees and destroy them, as soon as the webs are noticed.

The Apple-Leaf Sewer.

This insect, *Ancyclis nubiculana*, is found in small numbers in most orchards in Nova Scotia. The method of attack of this insect is peculiar. The leaf is folded along the midrib, the outer surfaces being brought together and the edges sewed with a fine white webbing. The larva feeds during the fall in this case or purse, and when the leaf falls to the ground it hibernates as a full grown larva in this leaf or case. Occasionally, outbreaks are found in which over half of the leaves in an orchard are sewed together by this insect. The most serious injury seems to be the causing of premature dropping of the leaves, which invariably causes a short bloom and crop the following year. Late fall or early spring plowing, to bury the hibernating larvae in the leaves, or thorough spraying with a very adhesive arsenical in the last two regular summer sprays, are the best means of control.

The Dock Sawfly.

The Dock Sawfly, *Taxonus nigrisoma*, has been found in some districts doing considerable damage to the fruit of the apple. In one orchard near Middleton, one-third of the Baldwins were found to contain the hibernating larvae of this insect. In some apples as many as five larvae were found. The larvae, greenish in color with black heads, do not feed on the apple but bore into the fruit, simply to find convenient hibernating quarters. A small hole is bored through the skin, and a hibernating chamber scooped out immediately beneath the skin. The food plants are the two docks, the curled and broadleaved. There are three broods a year in Nova Scotia. The remedy is to destroy all Dock growing in the orchard. In cases where it was not practical to remove the dock and the orchard becomes infested, tanglefoot applied to the trees, as for canker worm, in September, would prevent the larvae from ascending the trees and so damaging the apples.

The Shot Hole Borer.

The Shot Hole Borer, *Xyleborus pyri*, is found occasionally damaging trees that have been weakened from some other cause such as canker work stripping, or unfavorable soil conditions. Occasionally ten or twelve year old trees are found with hundreds of small holes in them. Such trees when too seriously infested should be destroyed. When the vigor of the tree is still moderate to good, treatment can be applied with good chances of saving the tree and controlling the insects.

Plugging the hole by driving in small wooden plugs and nails have proven successful in many cases, while experiments with carbon bisulphide injected into the holes with a spring bottom oil can, the holes being immediately plugged with clay or putty, have shown that all the insects in the tunnel may be killed in this manner. In case a tree is very badly infected a dressing of nitrate of soda or some such quick acting fertilizer accompanying the above treatments will often save trees that would otherwise succumb.

The Round Head Apple Tree Borer.

This borer, *Saperda candida*, occasionally injures the apple in Nova Scotia. Usually young trees are attacked. The eggs are laid on the bark in June and July. The larva feeds on the trunk of the tree for three years, at first in the sapwood, but later near the heart. Where the tunnels can be located by the discolored bark, a spike or punch should be driven in and a small quantity of carbon bisulphide injected from a spring bottom oil can and the hole plugged with clay or putty at once.

The Brown-Tail Moth.

This insect of European origin, which has been brought to Nova Scotia via the United States, has not as yet done a single dollar's worth of damage in the Province, but it has in it the possibility of becoming as serious, and doing as much damage, as any, or perhaps all of the insects that we have considered.

History.

The Brown-tail Moth was introduced into Massachusetts from Europe some time prior to its discovery in 1897, presumably on nursery stock. In 1907 the first nest was discovered in Nova Scotia by Mr. Perry Foote in Lakeville, Kings County. The infestation at that time extended from Lakeville, Kings Co., to Deerfield, Yarmouth Co.

The following table shows the number of nests taken each winter since its discovery:

1906-07	6,000	approximate
1907-08	4,000	"
1908-09	800	"
1909-10	1,496	"
1909-10	1,496	actual count
1910-11	4,362	"
1911-12	7,707	"
1912-13	11,054	"
1913-14	24,156	"
1914-15	18,154	"
1915-16	14,755	"

The area infested at the present time is approximately the same as in 1907, the year of discovery. The infestation extends a little farther east in the Valley, including a portion of Hants Co., otherwise it remains the same in distribution. Shelburne and Cumberland Counties were infested in 1913 by the big flight from the New England States. Since 1913 the Brown-tail Moth has been exterminated from both of these counties and the total number in the Province cut down to two-thirds of that of 1913-14.

Description and Life History.

The adult Browntail is a snowy white moth about 1½ inches across the expanded wings. Both sexes have a characteristic tuft of brown hairs at the tip of the body from which they get their name, Browntail. Both sexes are strong fliers and are frequently carried long distances by the wind, the Counties of Yarmouth and Shelburne having been infested in 1913 by female moths which blew across the Bay of fundy from infestations along the New England coast. In ordinary years a moderate flight of male moths is found at Yarmouth, but as very few nests are found after these flights have occured, we know that it is the exception for female moths to cross the Bay of Fundy from the New England coast.

The eggs are deposited on the under side of the leaves in late July or early August. The egg cluster contains about 300 eggs deposited in an irregular mass about one quarter of an inch wide and one half an inch long, and is covered with brown hairs from the tuft at the tip of the body of the female which adhere to the egg mass as the eggs are deposited.

In about three weeks the eggs hatch and the young larvae feed on the leaves within six inches of the egg mass, nibbling at the surface and reducing the leaf to a skeleton. As the season progresses one or more leaves are tied together with silk to form the winter nest. About Oct. 15th, this nest is well formed and dirty yellow in color, later bleaching out with the rain and sun to the characteristic grey white winter nest. On dry sunny days during the winter, these nests reflects the sun and appear a conspicuous bright white for a long distance; when dampened by fog or rain the white color disappears and the nest becomes a dirty grey, about the color of the bark of the tree and is very hard to see. The winter nests contain on an average, in Nova Scotia, about 250 caterpillars. These emerge when the first leaves appear in the spring, usually about May 1st. When they first emerge from the nest, the larvae are strongly positively heliotropic, climbing to the top of the branches and there feeding on the young leaves. In above two weeks the positive heliotropism disappears and the larvae scatter over the trees, feeding singly, and maturing about the first week in July. The full grown larvae are from 1 to 1½ inches in length, brown, very hairy, and with lateral rows of white spots on the abdominal segments, and a tuft of orange colored hairs on the dorsal side of both the 6th and 7th abdominal segments.

The pupa is formed either singly or with few others in one or more curled up leaves, the leaf being loosely drawn together into a very open cocoon of brown silk. The pupa is from ½ to 7-12 inches in length and brown in color. The pupal stage lasts about three weeks.

Food Plants.

The major food plant in Nova Scotia has always been the apple. The following table shows the percentages of nests formed on apple in Nova Scotia during the past four years:

1912-13	88.2	per cent
1913-14	86.1	"
1914-15	85.4	"
1915-16	74.3	"

Although the percentage on native trees is increasing as the years go on, there seems to be no immediate danger of the Browntail becoming a woodland pest in the province.

Control.

The Browntail Moth is now controlled by parties of inspectors, one half of whom are paid by the Provincial Department of Agriculture and one half by the Dominion Entomological Branch. These men work under the direction of a Dominion Field Officer who, under the Dominion Entomologist, is responsible for the carrying on of the work.

At the present time, ten inspectors are employed who, during the six months between November 1st and May 1st, cover all of Yarmouth, Digby, Annapolis, Kings and Hants counties, and scout the adjoining counties.

It was noticed today in the history of the infestation, that it was much easier to control the Browntails in the districts where a high percentage of the orchards were sprayed, than where spraying was not practiced. A campaign for more and better spraying was then instituted, the inspectors given suitable literature and instructed to call on every owner whose property was infested to pursuade him to spray if possible. The co-operation and help of the Dominion Fruit Inspectors, under Chief Inspector G. H. Vroom has been felt and appreciated, as has been the assistance of the officials and managers of the United Fruit Companies. The result of the thorough campaign for more and better spraying, carried on by these three organizations, some member of each being in direct touch with every fruit-grower in the province, has not only aided materially in controlling the browntail moth, but has also to its credit, the fact that it has been instrumental in causing Nova Scotia to have the cleanest crop of apples grown in Canada in 1916, a season most favorable to the development of scab and other diseases.

The best evidence of the extreme success of this campaign may be obtained by comparing the number of power sprayers sold year by year in Nova Scotia. One of the largest companies selling sprayers has placed the following:

1912	48	sprayers
1913	99	"
1914	153	"
1915	189	"
1916	238	"

When we remember that in 1916 the general opinion was that prices would be low in 1916-17 and also that this particular company ran out of power outfits and had to stop selling before the season was over, we can get a fair idea of the success of the fruit inspectors, the fruit company men, and the Browntail moth inspectors in convincing people as to the value of spraying.

The success of this spraying campaign which appears not yet to have reached its highest, will probably render the control of the Browntail an easy matter in the apple producing districts, but outlying orchards, small holdings and town properties, will have to be looked after for many years yet.

Parasites.

During the past three years the Dominion Entomological Branch has introduced the European predaceous climbing ground beetle, *Calosoma sycophanta*, partly to prey on the Browntail moths and partly in advance of the Gypsy moth which will come sooner or later, and two true parasites, a tachinid, *Compsilura consinnata*, and a Braconid, *Apanteles lacteicolor*, and one fungus disease, *Entomophthora aulicae*. Of these parasites only the Apanteles has been recovered. With the equipping of the new laboratory at Annapolis, the introduction, increase and spread of the parasites of the Browntail will increase, but we cannot look for quick spectacular results from this parasite work. At best it will be very slow work getting the parasites established so that they will be real factors in the control of the Browntail, although we realize that it is the only means of permanent control and we are making every effort to get the parasites established.

Spraying for the Various Insects.

The spray calendar prepared by Prof. W. H. Brittain, Provincial Entomologist, and the writer, gives a complete summary of controls of all biting insects mentioned in this article and for that reason detailed information as to controls has been omitted, and the reader is referred to the spray calendar for the best and most economical method of spraying to control the pests mentioned herein.

TACK THIS UP FOR REFERENCE.

Spray Calendar for Nova Scotia Apple Orchards for 1917

W. H. BRITTAIN, Agricultural College, TRURO, N. S. G. E. SANDERS, Dominion Entomological Laboratory, ANNAPOLIS ROYAL, N. S.

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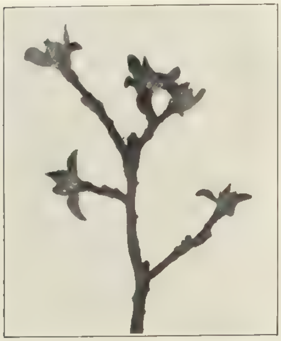
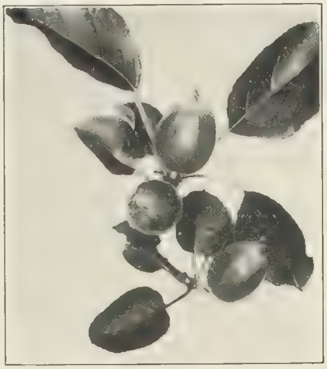
Spray Calendar for Nova Scotia Apple Orchards for 1917

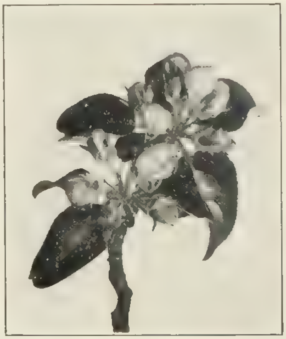
W. H. BRITTAIN, Agricultural College, TRURO, N. S.   G. E. SANDERS, Dominion Entomological Laboratory, ANNAPOLIS ROYAL, N. S.



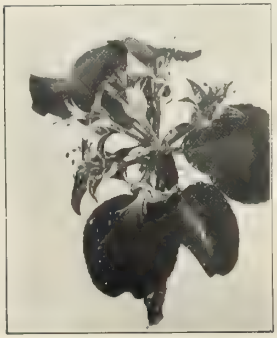
1st Spray.



5th Spray.



2nd Spray.



3rd Spray.

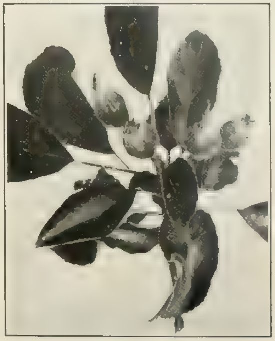
FIRST SPRAY

Time -When leaves about blossom clusters are showing green. For Canker Worm defer this spray for a few days.

Material:—Lime sulphur 1.009 sp. gr., or 3 gals. commercial strength, to 100 of water (1-33), adding powdered arsenate of lime, 2 lbs. to 100 gals.

Application: Drench thoroughly at 200 lbs. pressure, using a drive nozzle.

Pests Destroyed:—Apple Scab, Budmoth, Browntail Moth, Canker Worm, Tent Caterpillar, etc. If Aphids are present, add Blackleaf 40 3-4, 1 pint to 100 gals. water



4th Spray.

SECOND SPRAY

Time:—When blossom buds are showing pink at tips. For Canker Worm apply slightly earlier, for Green Apple Bug, leave until just before blossoms open.

Material:—Lime Sulphur, 1.007 sp. gr. or about 2 1-3 gals to 100 gals. of water (1-43) adding powdered arsenate of lime, 2 lbs. to 100 gals.

Application:—Drench thoroughly at 200 lbs. pressure, using a drive nozzle.

Application:—Drench thoroughly at 200 lbs. pressure, using a drive nozzle.

Pests Destroyed:—Apple Scab, Budmoth, Browntail Moth, Canker Worm, Fruit Worms, etc. If Green Aphis or Green Apple Bug are present, add Blackleaf 40, 1 pint to 100 gals, making certain that every insect is covered with the spray. For very severe infestations of Green Apple Bug, the trees must be banded before spraying with tree tanglefoot and kept clean cultivated until July 7th.

THIRD SPRAY

Time:—When Blossoms fall.

Material:—Lime Sulphur, 1.006 sp. gr. or about 2 gals. to 100 gals. water (1-50), adding powdered arsenate of lime, 1½ lbs. to 100 gals.

Application:—Use 200 lbs. pressure and a calyz nozzle.

Pests Destroyed:—Apple Scab, Pit Rot, Codling Moth, Fruit Worms, Budmoth, etc. If Green Apple Bug is present add Blackleaf 40, using a drive nozzle as in previous sprays.

FOURTH SPRAY

Time:—Ten days or two weeks after the third spray.

Material:—First Choice; Bordeaux 7.100, adding paste lead arsenate, 5 lbs. to 100 gals., or powdered arsenate of lime, 2 lbs. to 100 gals.

Material:—Second Choice; Lime Sulphur 1.005 sp. gr. or 1 2-3 gals. to 100 of water (1-60), adding 1 1-4 lbs. powdered arsenate of lime to 100 gals. water.

Application:—Use 200 lbs. pressure and a calyx nozzle.

Pests Destroyed:—Apple Scab, Pit Rot, Fruit Worms, Codling Moth, Tussock Moth, Fall Webworm, Red Humped Caterpillar, Yellow Necked Caterpillar, Fall Feeding Browntail Moth Caterpillars, etc.

In very wet seasons a fifth spray may be necessary to control **Apple Scab**. This is applied 10 days to 2 weeks after the fourth spray, and is the same in material and application. When Tussock Moths and Browntails are present in injurious numbers, the application of this spray is recommended.

NOTE:—Do not use arsenate of lime except in combination with lime sulphur or Bordeaux. If using a poison alone, employ arsenate of lead. Arsenate of lead may be used throughout if desired, in the strength of 2 lbs. to 40 gals.

COPIES OF THIS CALENDAR MAY BE OBTAINED ON APPLICATION TO EITHER OF THE ABOVE ADDRESSES

DISEASES OF FRUIT PLANTS.

H. W. Smith.

Nearly all the recognized diseases of plants are due to the growth of parasitic plants; a few diseases are rare and are due to some physiological cause and some to unknown causes. This article will deal chiefly with diseases due to parasitic plants.

When a plant appears unhealthy and an attempt is undertaken to find the cause the fruit grower should first make sure that it is not due to climate, soil, culture or situation. He should then look for injuries from animals, particularly insects and finally for a disease, as the disease is usually the most difficult to detect. As the symptoms of disease in fruits are so many and various no attempt will be made to summarise them here but rather the following directions are offered as probably the most efficient for an inexperienced fruit grower. The experienced fruit grower will be familiar with the healthy appearance of the plant and will notice the unusual or unhealthy growth. It is suggested that where a disease is suspected that the fruit grower look up the different symptoms of each of the different diseases till he finds those that corresponds to those present on his plants. It is to be borne in mind however that these symptoms are not present except at certain seasons and that their absence is to be so interpreted till the proper time for them to appear. Also it is to be remembered that diseases may occur that are not here recorded nor in any text available to our fruit growers. Where the grower is unable to determine the trouble satisfactorily he should appeal to the Agricultural College or The Experimental Farms at Ottawa. Even then a satisfactory answer may not be forthcoming. It is not always easy or possible to solve these problems.

For convenience the plant under cultivation is called the host and the plant causing the disease is the parasite. The latter is relatively small and often entirely inside of the host and not visible except where it sends special parts to the surface for reproduction. Sometimes the parasite may be external and conspicuous. As a rule plants thus causing disease are fungi (including Bacteria) and the special reproductive bodies are very minute and of various kinds depending on how they are produced. In general, these are called spores.

If none of these parasitic plants occurred in a locality then there would be no disease which would spread from plant to plant in that locality. While such an ideal condition does not exist with us, there are localities free from certain plant diseases just as localities may be free from certain contagious diseases among mankind. It is important to keep all diseases possible out of each locality. To do this all unhealthy plants, parts of plants and prunings from imported stock should be burned. Also it is evident that healthy plants are less likely to become diseased than unhealthy and every effort should be made to keep the fruit plants healthy by selecting suitable soil, situation and exposure, by proper cultivation and treating the plants the same each year, especially by avoiding excessive culture one year and giving none another year, (or the next year) by avoiding excessive fertilization as with nitrates or soluble fertilizers but rather by applying moderate amounts each year. Finally diseases in the main are to be prevented. The purpose of spraying is to prevent the spread of diseases. It will not kill the disease where it has become established. There is no known cure for plant diseases in the sense used for animal diseases. In some cases the disease may be removed with part of the plant but the important treatment is prevention. For this purpose spraying the healthy plants or parts with some application is often beneficial. As spraying will be treated in other articles in this series the reader is referred to them for further information except a few suggestions which might be overlooked. Plenty of lime in the Bordeaux mixture is desirable.

Sprays and Fungicides.

Bordeaux Mixture: This is prepared by dissolving one pound of quick lime in a little water and adding gradually more water to this and straining through cloth till the solution amounts to about nine gallons. In another vessel dissolve one pound of blue vitriol (copper sulphate) in nearly a gallon of water. This is more easily done if the water is hot and the salt is suspended in a cloth near the surface of the water. Cool this solution and add it to the lime soluution with constant stirring. Use only wooden utensils. This mixture should be used soon after mixing the two solutions and should be kept well stirred. There are many published methods of making this mixture. One method is about as good as another providing that one of the solutions or both are as dilute as possible.

Bordeaux mixture was the earliest used and in general has proven the best spray. It was the spray that demonstrated the value of spraying to control plant diseases.

Lime-Sulphur: This is the most convenient spray to use, as it is prepared so that all that is necessary is to follow the manufacturer's directions but it is only suitable for certain crops as the fruits and should not replace Bordeaux mixture for potatoes nor for other crops except where it has been demonstrated to be as good. Always use lead arsenate in this spray as it increases its fungicidal value.

Corrosive Sublimate.—This solution is prepared by dissolving one ounce of mercuric chloride (Corrosive sublimate) in six or seven gallons of water. Use wooden utensils.

Formaldehyde (*Formalin*).—This solution is prepared by adding one pound of formaldehyde of about forty per cent strength to thirty gallons of water or one part to three hundred parts of water.

Copper Sulphate (*Blue Vitriol.*—One pound is dissolved in fifteen gallons of water as directed under Bordeaux mixture.

Potassium Sulphid.—One ounce is dissolved in two and a half gallons of water.

Caution.—The above reagents are all poisonous and the utmost care should be exercised that the solutions and the utensils used in their preparation are not left where they may be accessible to live stock nor to persons unacquainted with them.

Sulphur Dusting.

The attention of the fruit grower is called to the method of dusting trees with a mixture of very fine sulphur and dry "fluffy" lead arsenate using eighty five pounds of sulphur to fifteen of the poison. This material can be diluted with terra alba. Where this dry material is properly mixed and applied it has been found as efficient and much cheaper than liquid sprays and not only more easily used but more rapid in application and capable of being applied when needed. It promises a great step in advance in the control of fungus diseases in the orchard. In rainy seasons apply the dust once a week.

With the great increase in the cost of spray materials, it becomes important to utilize every other method of disease control. This can not be over emphasized. It does not mean, however, that no spraying should be done. Quite the contrary. But what is more important than ever, it should be done intelligently.

Apple Diseases.

Cankers.—These are caused by a number of different diseases and where a canker is discovered the reader is advised to examine those descriptions occurring under the following diseases:

Blight cankers on twigs, branches and trunk.
European canker, on branches and trunk.
Coral canker, chiefly on twigs and branches.
Blister canker, on twigs, branches and trunk.

Black rot cankers, while occurring on all parts are much more common on twigs than elsewhere.

Cankers should always be removed and not be allowed to remain on the tree to spread the disease. It is usually best to remove the entire limb on which a canker occurs but it can often be successfully cut out and the wound washed with a disinfectant.

Wounds of Trees.

The healing of wounds in fruit trees deserves further investigation. Much that is written about it seems based on theory rather than any extended observation. It has long been known to botanists that an injury to a healthy apple tree was followed by the formation of a layer of cork just under and parallel to the injured surface. This takes place in healthy living wood but so frequently in this climate the center of the stems and branches of apple trees is killed that entirely different methods may have to be resorted to. It seems fairly certain, however, that exclusive of grafting wax most if not all substance usually applied to wounds do more injury than good in promoting healing.

As a rule it would seem best to let the injury alone after reducing it as much as possible and trimming off any irregularities and washing it with an antiseptic like corrosive sublimate solution or cover it with grafting wax if the heart wood is dead.

While corrosive sublimate attacks metals and therefore should not be used to wash utensils, the injury is very slight to the knife used in trimming or pruning if it is wiped dry or rinsed with clean water when through using, nor does the dipping of the knife into the solution materially weaken it.

The pruner can easily carry a glass or porcelain dish or pail of granite ware with the solution in it when pruning and a wooden handle with a swab attached.

Sphaeropsis Malorum, Black Rot.—This disease causes (1) decay of fruit especially such as is left on the ground. (2) Spots on leaves, which are easily recognized, as they are definite, usually circular and do not spread to involve the entire leaf, but the dead center frequently drops out leaving a hole. (3) Canker on trunks, limbs, and twigs. The trunk and limb cankers are not common here but the twigs are frequently affected. Orchards in which the leaves are affected with the spots mentioned above and twigs affected with a rough bark are probably injured by this fungus. The characteristic leaf spots serve for identification, but these cankers are hard to distinguish from other cankers except by careful observation.

Treatment.—Burn all dead twigs and cankers. Use formalin or corrosive sublimate wash for utensils and wounds Thus far this is not a serious disease in Nova Scotia but it is common. Thorough spraying with Bordeaux mixture as practised for scab with the aid of a winter spray of copper sulphate (or lime-sulphur) using one pound of the salt to 20 gallons of water, should help to control this disease.

Polyporus, Brown Rot of Wood.—Various Fungi which have fruit in the form of toad-stools, shelves or brown patches, attach fruit trees. Heart wood of such trees is dead, but the disease can not be identified till the Fungus fruits.

Treatment.—Usually nothing can be done but prevent the spread of the disease by destroying all the fruits of the fungus as soon as they appear.

Bacillus amylovorus, Blight, Fire Blight.—This disease also attacks plums and cherries and in certain seasons is very injurious to pears and apples. It attacks young twigs, blossoms and young fruit and older parts of the tree. The appearance of these attacked parts varies with the season. This disease may remain apparently dormant doing little damage for a number of years then in a single season prove very destructive.

As a rule it is not hard to distinguish the perennial cankers in this province as they are more characteristic than west of here, but the blossom and twig blight due to this disease is not easily distinguished from that due to other causes and without accompanying material and data, especially after drying and the death of the bacillus can not be distinguished so far as I am aware. Hence the identifying of this disease in the twigs is dependent upon these other data.

The *Perennial or Older Cankers* are situated upon the trunk or older limbs, those over three years old and usually much older unless in a very protected situation. These cankers usually extend lengthwise of the limb of a uniform width and about one fourth or less of the circumference but this varies. This strip usually extends till the limb joins another and it is bordered by a slightly elevated bark. In moist weather this bark is spongy and markedly unhealthy. As the canker grows older the bark cracks along these strips and adjacent limbs become involved in the same way or the entire limb dies. On the large limbs and the trunk of older trees, the affected area may not extend along the part and in such a case the canker becomes rounded. Such cankers where I have had the opportunity to see and watch then, do not live many years. Unless the canker progressively extends each year into fresh tissues it dies and the tree recovers. While the greater number of pear trees attacked by these perennial cankers die the reverse is true of apple trees but the injury often renders them worthless. These perennial cankers are the source of future danger to the orchard as it is in them the disease lives from year to year and they annually take toll from twigs and blossoms. On or about the time the trees are in blossom if these cankers are examined in moist weather or late in the evening, in fog or heavy dew, the unhealthy spongy bark will be found saturated and often the liquid oozing from it. This sap is loaded with sugary material and the bacteria which cause the disease. While it is stated that this sap flows in the day time and is visited by flies and bees I have found nothing to confirm this in our climate and after spending many hours searching for these I accidently found some of our transporters of this disease. I had been collecting moths in the evening from baited trees and went into the orchard to see if some could not be had from the apple blossoms. In passing near the cankers which I had so fruitlessly watched during the day I found them overflowing with sap and many moths, especially cutworm moths, Noctuidae, feeding upon it. These moths were also visiting the blossoms and would undoubtedly carry the bacteria with them.

Blossom and Twig Blight caused by this disease is not so easily recognized as the older cankers if we are to accept the commonly held view that most dead twigs are due to this disease. If a growing branch three years old or younger is attacked by this disease in June or July, the bacteria develops so rapidly that the entire branch is soon killed and the leaves blacken and remain hanging to it. This is very characteristic of the disease, especially on pears where it is common and occasionally on apple, cherry and plum. Pear leaves are also blackened by leaf blight, but only the leaves are then affected and not the twigs. Apple leaves may also be blackened without the twigs being killed, by certain troubles. When the bacteria of this disease are conveyed to the blossoms then the blossom dies and the disease ends there or the infection enters the twigs and dies. If the fruit spur is on an older branch then a perennial canker develops.

Treatment.—This consists in removing all affected branches and older cankers. The bacteria do not live long outside of the older cankers but it is best to burn all the parts removed. The saw or knife or whatever comes in contact with the disease should be dipped into formalin solution before using upon the next tree and the wounds washed with this solution or corrosive sublimate as soon as through operating. Remove the disease as soon as it is discovered no matter at what season of the year. Examine for older cankers in winter and again during blossoming, and damp weather.

Nectria ditissima, European Canker.—These cankers occur most commonly on older limbs or trunks or in the crotches. They annually become larger and each year's growth is marked by a ring surrounding the canker, which is quite characteristic. The fruit of the fungus is often conspicuous in the early spring as small, round, yellow to brown bodies on the bark surrounding the canker.

Treatment.—Remove all cankers whenever discovered and burn. Use corrosive sublimate to wash the wounds. Spraying the trees with Bordeaux mixture is considered beneficial.

Nectria cinnabarina, Coral Canker.—This canker occurs chiefly upon twigs and branches and fruits very abundantly. These fruits are red to brown when dry but in moist weather they are a very bright coral red and often in clusters as large as a pea.

Treatment.—Remove and burn all affected twigs and branches.

Nummularia discreta, Blister Canker.—Specimens of this disease have appeared on nursery stock imported recently and on young trees. The cankers have the dead bark of the affected area more or less retained and on this the fungus fruits giving its surface an appearance as if covered with pimples or blisters.

Treatment.—Remove and burn.

Pseudomonas tumefaciens, Crown Gall.—This disease occurs particularly on nursery stock and on garden vegetables occasionally. On nursery stock the name is so descriptive that little further description is required. It should not be necessary to state that only healthy stock and cion should be used by the nurseryman and that all diseased material should be burned but often crown galls appear only after being planted in the nursery row and the young tree otherwise seemed healthy enough. The galls are swelling or growths upon the stem where it was grafted or where injured in cultivating or sometimes where no apparent injury has occurred. It is when well developed, a nodular outgrowth.

Treatment.—Any material having an unhealthy growth upon it should be burned. If galls are found in the nursery the plants bearing them should be burned and a careful watch kept as other diseased plants are sure to appear. If it occurs commonly such ground should not again be used for nursery for some time. In no case should the galls be cut out and the knife used for further pruning until sterilized by dipping in formalin. In the orchard, affected trees should be removed but not replaced the same season by other trees. In every case these galls should be looked for in spring and again in summer and on large trees removed early in the season as they break down in autumn. They are light colored at first and become darker and more wood-like as the season advances.

Cylindrosporium Pomi, Fruit Spot.—A number of similar spots occur upon the apple from different causes. Hail occasionally marks the fruit and an obscure trouble called "Stippen" may occur but the most common trouble of this kind is due to a fungus, Cylindrosporium Pomi. When the fruit is mature a spot like a small round bruise is present and the affection extends towards the core as a cone of brown material. Spots can be detected when quite small late in July. The spores late in the season occur just beneath the affected skin.

Treatment.—Do not leave affected fruit in the orchard to decay. Continue the fungicidal spray used for Scab till late July using it rather weaker and if Bordeaux is used add more lime to the mixture.

Venturia Pomi and Venturi Pyrina, Apple and Pear Scabs.—The ascospores are mature from about a week or two weeks before blossoming till some time after the blossoms have fallen. All do not mature at once. These ascoscopes if they fall on the fruit at this time almost always cause it to fall or "Drop;" if on the leaf a spot or scab is formed. This takes ten days or two weeks to mature so that it shows or breaks the epidermis. As soon as a scab appears it begins to shed spores which are capable of growing on the fruit or leaves and causing scabs. These scabs live and produce spores, in this way for a long time. The young or immature scabs and possibly the older spots *after* the leaves have fallen, undergo a change during which the fungus grows and by the *following Spring* produces ascospores which may reach maturity shortly before the trees come in bloom.

The twigs of certain varieties as the McIntosh and pear twigs are also attacked by this fungus and may be killed, seriously injured or only slightly affected. The fungus remains alive over winter in some of these spots but I have found no ascospores produced there but it is possible that they may continue to produce conidia and this may be one of the causes of such varieties being more seriously affected by this disease. Affected twigs should be removed and burned.

Treatment.—Spray the trees thoroughly with Bordeaux mixture or Lime-sulphur or Dust Spray as the bud unfold and at frequent intervals as every ten days or two weeks, for three or four applications. It is desirable to have one application follow blossoming as soon as possible as this is the season of most rapid growth of foliage and the most abundant production of ascospores. Winter sprays of lime-sulphur should always be used where twigs are infected. The complete plowing under of all leaves in the fall or early spring is desirable.

Pink Rot.—This disease may follow scab but has not proven injurious in this province. The spray used for other diseases should control it.

Stereum purpureum, Silver Leaf.—This disease occurs chiefly on young trees usually within a few years after transplanting from the nursery. The leaves of a branch or of the entire tree in midsummer assume a silvery appearance and break or tear apart as they become old. The tree may otherwise appear thrifty. In the course of a few years, about the time it should begin bearing, usually it dies and purple sporophores, shelf-like fungi, appear on the branch affected or on the trunk near the ground if the entire tree is affected. They may appear on limbs also.

Treatment.—Remove and burn all affected trees as soon as detected.

Sclerotinia fructigena, Brown rot of Fruits.—This is the common cause of decay of fruits. It is promoted by warmth and moisture and retarded by cold. Insects are the efficient means of spores gaining entrance to the fruit. Practically all the brown dust or mold on the decaying fruit consists of the spores of this fungus. If such fruit is allowed to remain on the ground for two years under suitable conditions it then produces ascospores. Either of these spores if they find an injured fruit as where bitten by an insect readily penetrate and cause the fruit to rot. The curculio beetles are very injuries in this way. This is the common rot of stone fruits and is common on all early apples and pears.

Treatment.—Spray the trees early in the season with poisons to kill all insects that eat foliage and fruit and if plant lice or other sucking insects are present use contact sprays to destroy them. Pick and burn all wormy fruit from the trees if possible or utilize pigs to consume the fallen fruit. Thinning the fruit on the trees where it is set too thick also helps. Keep the fruit as cool as possible after it is picked and during shipping. The fungus often invades the twig from the fruit and kills it giving it the appearance of "Blight." Remove all such branches.

Blackberry and Raspberry Diseases.

These fruits are subject but not equal to the same diseases. In starting a plantation care should be taken to get or use only healthy plants as it is much easier to keep the diseases out than to get rid of them. Indeed the latter is in some cases impossible except by growing other crops on the land.

Glaeosporium venetum, Anthracnose.—This disease is characterized by the formation of purple or dark colored spots on the canes which as they become older usually become lighter in the centers. This produces a "Bird's Eye" appearance.

Treatment.—Plant only healthy plants. Do not use soil where the disease has previously existed. When a plant is affected remove and burn the entire plant as soon as detected. Spray with Bordeaux mixture during the early part of the season.

Cane Blight.—This is due to different causes. The canes wilt or partially wilt in the growing season. If this is not due to insect injury then it is best to remove the affected plants and burn them.

Pseudomonas tumefaciens, Crown Gall.—This produces swellings on the underground parts of the plants as mentioned under Apple Diseases. Nursery land infected with this disease producing organism should not be used for either these berries or root crops but devoted to grain and grass for a number of years.

Septoria Rubi, Leaf Spot.—This is easily distinguished by the numerous small spots on the leaves. Each spot develops a lighter center with a colored border.

Treatment.—If discovered in time pick off and burn all affected leaves. Spray during the growing season with Bordeaux mixture and destroy all leaves in the autumn.

Gymnoconia interstialis, Rust·—This disease may be found on the young canes but becomes conspicuous as the season advances by the abundance of yellow or orange colored spores produced. Eventually the host is killed after a number of years in which little or no fruit is produced.

Treatment.—There is no cure. Each affected plant should be dug up and burned as early as the trouble can be detected. Otherwise all plants will become effected.

Cronartium Ribicola, European Currant Rust.—This disease is not likely present unless it is or has been introduced with importations of White Pine. Wherever white pine has been imported and grown from imported trees a careful search should be made of both wild and cultivated currants for rust. The currant leaves will have spots upon them covered with a fine down or delicate hair-like growth. Any suspicious growth or appearance on currant leaves where imported white pine occurs within half a mile should be sent either to Ottawa, to the Experimental Farm or to this college with an account of the attendant circumstances. While not a serious disease of the currant it is of the pine.

Cherry and Plum Diseases.

Plowrightia morbosa, Black Knot of Cherry and Plum.—The black knots which disfigure plum and cherry trees are familiar to every one and are very conspicuous when the leaves have fallen but the beginning of one of these is less frequently seen. The place first swells and feels springy to the touch and the bark cracks open and exposes the fungus which is light brown and quite velvety but later gradually grows into the black knots. It begins to shed spores as soon as the bark cracks open. This may occur at any time in the growing season but is most frequent in summer and is then easily overlooked. The ascospores are shed after the knots become black about June the following year.

Treatment.—Remove and burn all knots as soon as the leaves have fallen. In June and again in August search for the newly formed knot. If the trees are badly affected spray after blossoming with Bordeaux mixture which has been made with one third to one half more water than stated in the directions for making. Destroy all wild and neglected trees bearing knots, any where near the orchard.

Exoascus Pruni, Plum Pockets or Bladder Plums, Witches' Bloom of Cherry.—This very common disease lives in the twigs of the plum especially those bearing fruit. After blossoming the diseased fruit grows much more rapidly than healthy and soon becomes almost white, swollen and with little or no pit. The ascospores are shed from the affected fruit (Or more frequently these ascospores multiply and produce many small spores, conidia.) and inoculate other twigs.

Treatment.—As soon after blossoming as the affected fruit can be detected remove all such fruit and the twigs on which it is borne and burn them. Any affected fruit that drops off should be picked up and destroyed. With care this will remove the trouble in a couple of years, if not too badly established. Care must be taken to remove all uncultivated cherry and plum that might harbor the disease.

Bacillus amylovorus, Blight.—See Apple Disease. This disease may be confused on plum and cherry with a twig blight caused by Brown Rot of Fruit.

Sclerotinia fructigena, Brown Rot of Fruit.—This is the common cause of the decay of these fruits and is promoted and distributed chiefly by insects. Thinning the fruit is important and the destruction of all fallen fruit. The destruction of insects that feed upon these fruits is of first importance. See this disease under Apple Diseases.

Pseudomonas tumefaciens, Crown Gall.—See Apple Diseases.

Brown Rot of Wood.—See Apple Diseases.

Cylindrosporium Padi, Shot hole disease or Leaf Spot.—The spore of this fungus soon germinates after coming in contact with the leaf of the cherry or plum. It penetrates the epidermis and in a few days has developed into a fungus in the interior of the leaf capable of producing spores, the leaf tissue involved is killed and in many cases drops out leaving a somewhat circular hole which gives it one of its common names. But under other conditions this piece may remain attached to the leaf as a circular dead area. The leaves may be seriously injured.

Treatment.—Often the attack may be so far advanced when discovered that the trees lose their leaves in Summer. If the trees are in sod burn over the sod when dry in early spring so as to destroy the leaves. If in cultivation bury all leaves by careful plowing. Spray with Bordeaux mixture which has been made with about one half more water than the standard mixture. Do not wait for the appearance of the trouble the following year but repeat the treatment.

Currant Diseases.

Pseudopeziza Ribis, Anthracnose.—Small brown spots appear on the leaves and eventually on the younger parts of the canes and on the leaf stalks when the attack is severe, and the leaves fall. Compare also "Leaf Spot." This is a serious disease when introduced. It lives in these spots and in spring has developed from the same spots which produced summer spores, ascospores capable of infecting the fresh growth of that season.

Treatment.—If only a few plants are affected, it would be well to remove and burn the plants as soon as the disease is detected. Spray with Bordeaux mixture. Begin as soon as the buds open and repeat at least five times at intervals of ten days to two weeks or longer as the season advances. When possible the fallen leaves should be raked up and burned in the autumn and any remaining leaves carefully buried by spading the soil in early spring.

Nectra cinnabarina, Cane Blight.—See coral Canker under Apple. The characteristic fruit occurs on the canes and all affected canes should be removed and burned.

Septoria Ribis, Leaf Spot.—This disease occurs on both currants and Gooseberries. The spots are like those on the Raspberry leaves. They are larger than those of anthracnose and have a paler center with a colored border. They are much more distinctly defined from the healthy leaf.

Treatment.—Spray as directed for anthracnose. Pick affected leaves if only a few and burn them.

Sphaerotheca Mors–uvae, Currant and Gooseberry Mildew.—This disease occasionally causes loss in our moist climate, especially in damp and shaded gardens. It also attacks currants. It is easily recognized by the leaves, and twigs and especially the fruit being covered with a white mildew which often gradually turns brown. Young twigs may be killed. When once established it is hard to control.

Treatment.—Spray as soon as the buds begin to swell with potassium sulphid solution or dust with sulphur and repeat in ten days or less and give a third spray ten days later. Pick and burn all affected fruit. Prune thoroughly and destroy the cuttings. Repeat the spray the following year even if no evidence of the disease appears. Winter spray of lime-sulphur may be beneficial. Sulphuric acid one part to 1000 parts of water is recommended as a spray.

Gooseberry Diseases.

Septoria Ribis, Leaf Spot.—See Currant diseases.

Sphaerotheca Mors-uvae Mildew.—See Currant Diseases.

Puccinia Pringheimiana, Rust.—The attacks of this rust occasionally occur and are very conspicuous. Portions of leaves and fruit are misshapen and become covered with cupshaped depressions filled with a yellow powder, the spores. These do not grow again on the currant or gooseberry but will produce the fungus on sedges and from these sedges the gooseberry is attacked the following year.

Treatment.—By drainage and other means destroy sedges growing near the gooseberries and pick and burn all affected fruit and leaves of the gooseberry bushes as soon as discovered in order to prevent the sedges from becoming infected. Cutting the sedges late in autumn or early spring is beneficial.

Pear Diseases.

Bacillus amylovorus, Blight, Fire Blight.—See Apple Diseases.

Pseudomonas tumefaciens, Crown Gall.—See Apple Disease.

Decay of Wood.—See Apple Disease.

Venturia Pyrina, Scab.—See Apple Disease.

Entomosporium maculatum, Leaf Blight.—This disease attacks pears and quinces. There appear at first small spots which are fairly round and which may become so numerous as to kill the leaf. As they grow older they do *not* acquire a pale center but the red centers turn brown and the spots are not very evident on the lower surface of the leaf. On the fruit the red color of the young spots may help to distinguish them from "Scab,".

Treatment.—If seen when the infection is slight pick off and burn the affected leaves and in any case spray with Bordeaux mixture.

Septoria Pyricola, Leaf Spot.—In this disease the spots on the leaves grow larger than in leaf Blight and as they become older the centers become gray and eventually develop minute black dots in the gray which is in turn surrounded with a colored border.

Treatment.—Spray with Bordeaux mixture early in the season.

Gymnosporangium, Rust.—Rust occasionally attacks apples but pears and quinces are more frequently attacked in this province. The fungus causing the trouble lives alternately upon the fruit plant and dwarf juniper or cedar. The disease is easily recognized on the fruit plants. It may attack either fruit, twig or leaf. The part becomes swollen, distorted and produces cupshaped depressions filled with spores. These spores do not again grow on the fruit tree but must find the coniferous host. There in the spring they produce in damp weather gelatinous swellings.

Treatment.—Destroy the bush junipers and cedars growing near orchards. Where possible pick off and burn all affected parts on the fruit trees before the spores are shed.

Plum Diseases.—See Cherry.

Quince Diseases.

Bacillus amylovorus, Blight.—See Apple Diseases.

Entomosporium maculatum, Leaf Blight or Fruit Spot.—See Pear Diseases.

Gymnosporangium, Rust.—See Pear Diseases.

Strawberry Diseases.

Mycosphaerella Fragariae, Strawberry Leaf Spot.—These white spots with purple borders on the leaf of the strawberry are easily recognized. The disease attacks most severely Old Country varieties, and frequently does considerable damage. The spores are shed all summer from the spots. "Ascospores when produced are said to appear late in the season."

Treatment.—Remove and burn affected leaves, if not many are affected, early in the season. If very abundant cut in autumn and burn over the plantation. Exercise great care to plant only healthy plants and remove all effected leaves.

Fruit Rot.—This is caused commonly by three diseases of quite different botanical characters. Their control however is practically the same. After the fruit is picked it should be stored, or shipped in as cool and well ventilated condition as possible. Crowding, moisture and heat promote decay. Care should be exercised to reject all berries which are soft as when decay starts it soon spreads through the box.

The Winter Care of Fruit Trees.

All dead twigs and branches should be removed in winter and burned as the spores of canker particularly are produced from the dead wood. It is easy to see the dead branches and remove them at this season.

All wounds made by pruning can be washed when made, with a solution of corrosive sublimate or formaldehyde, and bound with a cloth that has been coated with grafting wax. This facilitates healing and excludes the spores, which might otherwise lodge and grow there.

Where any of the above diseases exist, as their spores may lodge on branches, twigs, or buds, it is advantageous to spray the dormant trees with some winter spray. White-wash, copper sulphate or lime-sulphur is efficient. The important point is that the spray shall be applied thoroughly to the twigs and buds as well as the larger branches and trunk. White-wash should be applied early in winter; and other sprays towards spring. Old fruit attached to trees should be picked and destroyed as they furnish a place for fungi.

Early Spring Care of Fruit Trees, Till Apples Blossom.

All cankers should be examined and every evidence of dead wood removed and burned. Such cankers as appear spongy and soft or have a fluid exude when pressed or from which a fluid escapes should be not only trimmed but great care should be taken to wash and bind the wound as directed for wounds in winter, as such cankers may be due to fireblight and actively shedding their bacteria. These the corrosive sublimate solution will kill. If there are bud-moths in the orchard or if tussock, tent or brown-tailed moths are liable to be present, so that an early spray is required when the buds are swelling, then use in addition to

Bordeaux or lime-sulphur spray the poison spray. If such poison spray is not required this early spraying may safely be omitted in orchards which have been well cared for; but it is in every case important that a thorough spraying with one of these spray mixtures should be made before the blossoms unfold. Even though no fungus has been found in the orchard, this spraying would be advantageous as a measure to prevent their gaining a foot-hold. This is the season when most of the ascospores produced on the diseased fruit and twigs begin to develop and grow.

Early in the spring, before blossoming time in cultivated orchards the ground should be plowed and all leaves and fallen fruit buried. Orchards in sod where scab is very bad should have the aftermath in autumn left on the ground and burned on some dry day in early spring so as to destroy the fallen leaves and fungi attached. The fruit grower whose fruit is not seriously injured by scab cannot afford to sacrifice such good humus. Indeed, in most cases early plowing would be the wiser course. A jointer should in every case be attached to the plow where there is difficulty in completely burying the leaves.

Later Spring Care of Fruit Trees.

After blossoms fall the spray given before blossoming should be repeated, preferably within a week after the bloom is off. This spray is second only in importance to the spray preceding the blossoming. If in previous seasons any of the above diseases have appeared in the orchards, particularly scab, this spraying must be made.

The cankers treated previously should be examined. Search for plum-pockets should be made and all such together with the twigs to which they are attached, removed and destroyed. All "black knots" in their early stage of growth, should be removed and burned.

Where the orchard has been seriously affected previous seasons with any of the above diseases, it will be desirable to repeat this spray again, and in some cases a second repetition at an interval of two weeks.

RASPBERRY AND CURRANT INSECTS.

W. H. Brittain.

Raspberries and Currants are crops not widely cultivated on a commercial scale in Nova Scotia, though common everywhere in gardens. They are attacked by very few insects and might readily be grown on a much larger scale.

The Raspberry Cane Borer.

(*Oberea bimaculata.*)

It is a common sight about the first of July to see numbers of raspberry or blackberry canes with tips drooping and wilted. On examination the wilting will be seen to be due to a double row of punctures girdling the stem. Further observation should reveal the fact that these punctures are the work of a slender long-horned, dark-colored beetle, having a yellow thorax, usually marked with two black spots.

The punctures are made by the strong jaws of the female beetle, who then deposits her egg between the two rows of punctures in a deep slit. The grub which hatches from the egg immediately begins to burrow downward in the stem. The next winter and the following summer are spent in the cane, the work of the insect usually resulting in the destruction of the cane before the fruit matures. The insect passes its second winter at the base of the cane, below the surface of the ground. In the spring it transforms to a pupa and late in June or early in July, the adult beetle appears.

Control.

The wilting of the tips of the canes following the work of the egg-laying female is conspicuous, and such tips can be easily cut off and destroyed. All bearing canes found to be infested should likewise be removed and destroyed in a similar manner.

The Imported Currant Borer.

(*Aegeria tipuliformis*)

The adult of this insect is a beautiful clear-winged moth with a dark abdomen crossed with three or four horizontal yellow bands. It has a wing expanse of ½ of an inch. The larva is white, with brownish head and legs. When full grown, it measures about ½ an inch in length.

Life History and Habits.

The eggs are laid singly on the bark early in summer. On hatching the larvae bore their way into the stem and work their way up and down through the pith, thus killing the cane. The full grown larva hibernates in its burrow. With the arrival of spring, it bores out to the surface until only the outer bark separates it from the outside. It then transforms to a pupa and, when about to emerge, works its way partly out of the cane. When the moth finally emerges the empty pupal case is left projecting from the cavity.

Control.

The only remedy is to cut out and burn the infested canes.

The Imported Currant Worm.

(*Pteronus ribesii Scop.*)

The greenish, black-spotted larvae of these insects are numerous and destructive almost everywhere. The adults are small four-winged flies, the female being one-third of an inch in length and the male one quarter of an inch.

Life History and Habits.

The adults appear early in the season as the leaves are unfolding and the eggs are laid on the under side of the leaves along the principal veins. The young larvae on hatching first feed in groups eating small holes through the leaves, but later they scatter over the plant. They are voracious feeders and when numerous will soon strip a bush of its leaves. When full grown they descend to the ground, where they spin their cocoons among the leaves and rubbish. There are two complete broods of this insect, the flies of the 2nd brood appearing during July. The winter is passed by the larva inside its cocoon.

Control.

As soon as the larvae are noticed spray with lead arsenate at the rate of 2 lbs., or Paris Green ½ lb., to 40 gallons of water. When the fruit is nearly ready for picking hellebore may be used, 1 lb. to 8 gals., or dry at the rate of 1 lb. to 5 of air-slaked lime or other dilutent.

STRAWBERRY INSECTS.

By W. H. Brittain.

A number of insects attack the strawberry in Nova Scotia, but we have seldom received complaints of damage to this crop, except from white grubs and wire worms, principally the former. Both are most destructive where the plantation has been set out on newly broken sod land, in which the grubs are frequently abundant.

White Grubs.

(*Lachnosterna spp.*)

White grubs are the larvae of the so-called "June Bugs," which, attracted by the light, occasion so much annoyance by flying in at open windows during May and June. They are large fleshy, curved, whitish grubs, whose natural food consists largely of the roots of grasses. They thrive in old meadows and pastures, where they frequently attain enormous numbers. When deprived of their natural food, however, they will feed readily on the roots of various cultivated plants including the strawberry, and thus may occasion much loss.

Altogether three years are spent by the larvae in the ground. In the summer of their second year, having reached full size, they pupate inside an oval earthen cell a few inches below the surface. In the fall they transform to the adult beetle, but usually remain inside their cell until the following spring.

Control.

No suitable soil insecticides have, as yet, been devised to destroy the grubs, and no simple method of controlling them is known. Strawberries should never be set out on badly infested land, but a location should be chosen that is known to be reasonably free from grubs. The plantation should not be left down too long, but should be alternated with some leguminous crop such as clover, beans or peas, which are more or less immune.

Wire Worms.

(Elateridae spp.)

Wire worms are the larvae of the so-called "click beetles." They are relatively, long, narrow, yellowish, hard-shelled grubs that flourish under similar conditions to those that favor the white grubs, and their life histories are very similar.

As in the case of the white grubs there is no substance that can be applied directly to the soil to destroy the grubs. The same methods recommended for the control of white grubs apply with equal force to this species. Continuous cultivation, especially late in the fall, that breaks up the hibernating cases of the grubs and exposes them to the action of the weather, is of value. On small plantations poultry is very useful in helping to destroy the grubs.

THE CARE OF THE BEARING ORCHARD.

P. J. Shaw.

Generally speaking, the yields from well cared for orchards are larger, the crops are more regular and the profits greater than from orchards which do not receive such care. Fruit trees will sometimes produce crops with but little attention as to cultivating, fertilizing, pruning and spraying. But such trees are usually found in locations specially suited to the growth of fruit or the yield is variable: a good crop in favorable seasons and little or none in other years. When poor seasons for fruit occur the orchards which have been neglected or are situated in the least favorable places are those most likely to fail. On the other hand, those orchards which have been well cultivated, fertilized, pruned and sprayed often bear crops in seasons and in situations in which the others do not.

Regularity of crops is more likely to be obtained when orchards are properly cared for than when partially or wholly neglected. In the latter case the conditions approximate those under which the wild fruits grow, the crops of which are notably irregular and uncertain. The orchard which produces even moderate crops every year is likely to be more profitable than the one which produces occasional heavy crops in good years and little or no fruit in other years. The years of good yields in such an orchard are likely to be those of low prices.

While cultivation, fertilization, pruning and spraying are necessary for the best success for most orchards, it sometimes appears that extra attention paid to one of these operations will to some extent take the place of that paid to another. A tree well fertilized, for instance, especially if liberally supplied with humus, may give good returns without cultivation, while a tree growing in well cultivated soil frequently yields a good crop without the application of fertilizer. Similarly a tree well pruned is likely to produce cleaner fruit than one unpruned. But generally, in managing an orchard, the surest and most economical way to get good results from an outlay on any one operation is to give each of the others its due attention under the assumption that the trees will respond to the good care given them. The neglect of one of these operations, such, for instance, as spraying, may through partial failure of crops result in a loss of much of the labor and expense involved in the application of the others.

Tillage.

Early in the spring orchard lands are soft and moist. As the season advances they become drier and firmer and fit to handle, or to till. If they are left then without tillage they soon become dry and hard to such an extent as to be unfitted for the best growth of many crops, including the trees themselves. One of the objects of orchard tillage is to prevent the soil from getting into this hard condition. By plowing it as early as it is fit to work and following this plowing by successive harrowings or cultivations it becomes fine, loose, open, mellow, mealy and friable. These characteristics constitute what is known as a condition of good tilth in the soil. Good tilth is that ideal state of cultivation or preparation of the land which every good farmer or gardener likes to have before sowing his crop. The conservation of moisture and the production and maintenance of good tilth in the soil are the results of proper tillage. The addition of humus to the soil greatly aids in bringing about both results. Cultivated plants thrive better in soils in good tilth than they do in hard, dry, lumpy soils and fruit trees do not differ in this respect from other cultivated plants.

By improving the physical condition of the soil in making the particles finer and the texture more open and mellow, tillage provides more freedom for the development of the roots of trees. The soil warms up earlier in the spring and the excess of moisture dries out more quickly in tilled soils than in untilled. The presence of air is necessary for the normal development of roots of trees and for the growth of beneficial bacteria which add to the supply of plant food in the soil. Certain chemical changes take place more readily when an abundant supply of air is present in the soil than they otherwise would. Proper tillage, resulting in a condition of good tilth, gives the air and rain free access to the soil and thus helps to bring about the best condition for the growth of trees.

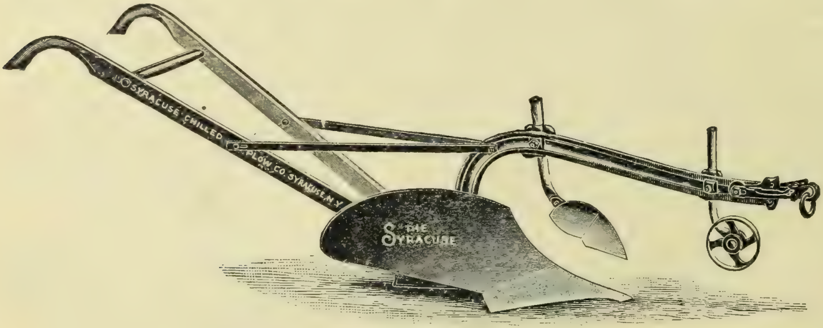
Our annual rainfall averages over 40 inches a year and profitable agriculture is possible in climates with as little as 10 to 15 inches, provided this is conserved by proper soil cultivation. By making the soil fine, loose and open, as in fall and early spring plowing, tillage puts the ground into a condition to absorb and to hold the maximum amount of rainfall, whether this comes in the dormant or the growing season. The after-tillage in the orchard with the harrow provides and maintains the surface mulch which conserves for the trees the moisture already present in the soil. This is done for the forest by the carpet of leaves on the ground and the canopy overhead. But since neither condition is practicable in a successful orchard, proper tillage with the resulting dust mulch fills the office instead. The important point is to begin the tillage early enough in the season to put the soil into a proper condition to absorb the rainfall when it comes and to prevent as far as possible the later evaporation from the surface. If the plowing and harrowing are left until late in the spring a large part of the moisture may be lost before the effort to save it begins.

That tillage is better than sod for apple orchards in New York State was shown by an examination of 564 orchards in Orleans County, containing 4,881 acres. The average yields and incomes from these orchards for five years as given by the Cornell Bulletin No. 229, were as follows:

Orchards	Average Yields bushels.	Average Income
Tilled ten years or more	327	$180.00
Tilled five years or more	274	138.00
Tilled over half of preceeding five years	225	113.00
Sod over half of preceeding five years	222	107.00
Sod five years or more	204	98.00
Sod ten years or more	176	87.00

Experiments with sod and tilled orchards at several Experiment Stations in the United States and in Great Britain have shown that tillage was better for orchards than sod. The results of tillage at the Geneva Station showed in the increased yields of fruit in the tilled plots over the untilled. The quality of the fruit was better, and it kept longer than that from the sod plots. The trees made greater growth, had better foliage and less dead wood in the tops than those of the untilled plots. There was a deeper rooting of the trees in the tilled plots and a better supply of humus and nitrogen in the soil than in that of the untilled plots.

In bearing orchards the ground should all be given up to the trees. As a rule, this ground should be tilled annually, especially if it consists of light, poor soil likely to suffer from lack of moisture in the growing season. There may be exceptions where fruit trees grow on deep, rich, moist soil, but in the great majority of orchards tillage should be the rule. The approved practice is to plow the ground in the fall or early in the spring and to follow this through the months of May and June with frequent harrowings or cultivations until the time to sow the cover crop in July. This cultivation of the orchard land through a period of six weeks or two months gradually brings the soil into finer and finer condition until when the time for sowing the cover crop arrives it can be tilled with the lightest orchard implements.

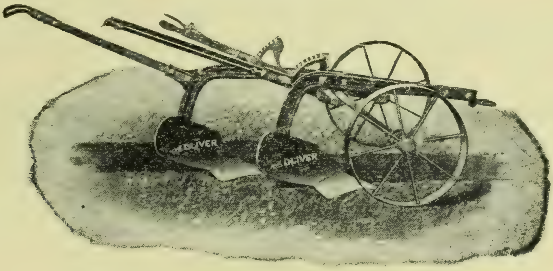

SYRACUSE CHILLED PLOW CO. SYRACUSE, N.Y.
THE SYRACUSE

A good type of plow for a light team.

For good work in the plowing of most orchard soils, especially if they are loamy or light soils, a plow with an abrupt moldboard should be used. Such a plow breaks and pulverizes the soil better than the Scotch type which is made for stiffer and heavier soils than most orchard land. The orchard plow should have short handles for convenience in working between the trees. The Syracuse and Oliver types of plows are recommended.

The harnesses and whiffle trees should have no unnecessary projections to catch and injure the branches and trunks of the trees.

While cultivation is the general practice in most well managed orchards there are modifications of this practice which are successful under the right conditions. When an orchard has reached the bearing age the roots of the trees extend to a considerable distance and may reach half way or more across to the adjoining tree row. A strip of sod two or three feet wide is sometimes left along each row of trees in such orchards, the intervening spaces being regularly tilled. In this case the greater part of the root system of each tree is in tilled ground and well supplied with moisture if the land is sufficiently tilled. The trees may do as well as if the whole ground were under cultivation. The advantages of this system are that there is less land to plow and harrow than there otherwise would be; the most difficult part to till is removed from cultivation and, where the trees are subject to high winds in soft ground, they are steadied and held in place by the sod. The disadvantages are the unfavorable appearance which such an orchard presents to those accustomed to clean cultivation and the harbor provided by the grass for mice and injurious insects.



A good type of plow for a heavy team.

Another modification of sod culture is where alternate strips between adjacent rows of trees are left in sod while the others are given clean cultivation. The cover crop of clover sown in July is allowed to occupy the ground in these alternate strips during the following season. The remaining strips are given clean cultivation as usual up to July of that season when they are seeded to clover to remain in sod the next season. In the meantime the strips which have been in sod one year and a half are plowed up and kept cultivated while the others are in sod. In this way, half of the root system of each tree is always in cultivated soil and half in sod. The thorough cultivation of half the land about a tree seems sufficient in some cases to maintain the amount of moisture required to ensure the healthy growth of the tree. A thick clover sod is thus produced to be plowed under for humus. Only half of the orchard land has to be cultivated through the season and the sod furnishes firm ground over which to drive spray outfits and other teams.

The Sod Mulch Method.

Some fruit growers in Nova Scotia have tried the sod mulch method of orchard management with apparently good results. By this method the orchard is seeded down to grass and clover and the herbage mowed several times each season and either left where it falls or placed around the trunks of the trees for a mulch. On deep, rich soils, on steep slopes which are apt to wash, and on land too stony for convenient cultivation the sod mulch method might be advisable. Some of the advantages claimed for the method, by Mr. G. P. Raymond, who recommends it, are that it requires less work in caring for the orchard than the method of cultivation. Fillers may be kept longer and the trees headed lower and planted thicker than by the other system. Windfalls are cleaner and not bruised as much as under the system of clean cultivation. Apples will have less black spot with the same amount of spraying, spray outfits can be hauled over the ground with less difficulty, trees are less liable to collar rot and the apples have a higher color than under the system of cultivation. Mr. Raymond uses only one kind of fertilizer, nitrate of soda, in his orchard under the sod-mulch treatment.

It will be noted that in the sod-mulch method the grass is mowed and left on the ground. If the grass were removed from the orchard, as in the majority of cases it would be, or the ground were pastured with live stock, not nearly as good results could be expected.

Fertilizing the Soil.

The problem as to the kind and the amount of fertilizers to use on fruit trees is a complex one and one that has not yet been fully solved. The same kind of trees on different soils and under different systems of cultivation might reasonably be expected to have different requirements as to fertilizing. Just how much of any kind of plant food the soil can be depended upon to furnish from its original store in any given instance is unknown.

Chemical analysis, however, shows that fruit trees take from the soil the same elements of plant food as the ordinary farm crops. The quantity taken in the fruit and the leaves of apple trees of bearing age on a given area of ground is greater than that taken in the grain and straw of an ordinary wheat crop from an equal area. According to Roberts' estimate the value of the plant food removed from the soil each year by the fruit and leaves of an acre of bearing apple trees is $10.37 as compared with $6.41 worth removed by the grain and straw of an acre of wheat. If to the value of the plant food in the fruit and leaves is added the value of that locked up in the wood of the trees it makes a total of $13.87 for the amount removed each year from the acre. As previously stated, it is not known how much of this value the soil can be depended upon to supply nor how much may be returned to the soil in fallen leaves and dropped fruit plowed under.

The principle upon which market gardeners proceed in their most intensive operations is to bring the soil into the best possible physical condition or tilth by the application of barnyard manure and by tillage and then add commercial fertilizers containing plant food in excess of the requirements of the crop. However justifiable this may be in market gardening where the profits may depend in a large measure upon the earliness and the quality of the crop such a practice would be regarded as an extravagant use of manure and fertilizers in less intensive farming operations.

Stable manure in moderate quantities is good to use on orchard soils but the problem usually is to get the manure for this purpose. It is especially useful for orchard land lacking in humus and shaded to such an extent as not to produce good growths of cover crops. It is relatively rich in nitrogen, average manure containing .5 per cent each of nitrogen and potash and about .35 per cent phosphoric acid. If applied to bearing orchards in large quantities it is liable to produce excessive wood growth at the expense of fruit production. Light dressings of manure are applied annually by some orchardists who are fortunate enough to have it to use in this way. An economical method is to use eight or ten tons per acre every three or four years and to supplement this with commercial fertilizers containing phosphoric acid and a small amount of quickly available nitrogen. The fertilizing materials can then be supplied to the trees more nearly in the proportions in which they are required, in the right amounts and at the time they are needed better than they could be through the use of manure alone.

But the difficulty in most cases is to get the manure for use in bearing orchards. If live stock is kept the manure must be utilized to grow feed, unless there is much permanent hay land on the farm. Feed cannot well be grown in a bearing orchard. Most fruit growers, then, find it necessary to use chiefly commercial fertilizers and cover crops to keep up the fertility of their orchard soils. It is fortunate that this substitution is possible. Otherwise the fruit industry in this Province would not have been capable of the development which it has already undergone.

When commercial fertilizers first began to be extensively used in orchards in the Annapolis Valley it was a common practice to apply annually 150 pounds per acre each of bone meal and muriate of potash. The cover crop was expected to supply the nitrogen. This represented an outlay of about $6 an acre for fertilizers which, with about $2.40 for cover crop seed when crimson clover was used, made a total of $8.40 per acre for fertilizing materials. Having in mind the value of the fertilizing materials which apple trees take from the soil this was a reasonable amount to apply and in many cases it appeared to give satisfactory results.

Cheaper sources of phosphoric acid have since been found in acid phosphate and basic slag. Potash is not now considered as important in orchard fertilization as formerly. It has been shown, too, that it pays to use some quickly available form of nitrogen for bearing fruit trees and not to depend on the cover crop altogether for a supply of this fertilizing material. The nitrogen of the cover crop and of other organic matter in the soil becomes available as decay takes place. This occurs more rapidly during the warm weather of midsummer than in the early spring. In order to give the trees a start and especially to strengthen them when the fruit is setting, it is advisable to apply a dressing of nitrate of soda during the latter part of May or the first part of June. Some growers believe that they get good results from applying it just as the buds are bursting.

Many different recommendations have been made for fertilizing bearing orchards and much difference exists in practice. Van Slyke, Chemist at the Geneva Station recommends the following for an acre of bearing orchard:

Cotton seed meal	100 lbs.
Ground bone	100 "
Acid phosphate	100 "
Muriate of potash	100 "

E. B. Voorhees, Chemist at the New Jersey Station recommends:—

Raw ground bone	400 lbs
Acid phosphate	400 "
Muriate of potash	400 "

Some orchardists in this Province use 600 to 800 pounds of slag per acre and plow under a crop of vetch each year for the nitrogen. Others use 500 pounds of slag or the equivalent of acid phosphate and 200 pounds of nitrate of soda per acre.

Stewart's recommendation for bearing orchards in Pennsylvania is 30 pounds of actual nitrogen, 50 pounds of actual phosphoric acid and 25 to 50 pounds of actual potash. The nitrogen might be applied in 100 pounds of nitrate of soda and 150 pounds of dried blood or in 150 pounds of sulphate of ammonia per acre, the phosphoric acid in 200 pounds of bone meal or in 350 pounds of acid phosphate or in 300 pounds of slag, and the potash in 50 to 100 pounds of muriate of potash.

The object of using the dried blood with the nitrate of soda or the sulphate of ammonia in place of both is to supply part of the nitrogen in a slowly available form and thus avoid loss of this material and over stimulation of the trees at the start. Two hundred pounds of nitrate per acre applied in two or three dressings with an interval of ten days or so between the applications would accomplish about the same result. One hundred and fifty pounds of fish fertilizer might be substituted for the dried blood.

If muriate of potash is not obtainable the potash might be supplied in 300 to 600 pounds of wood ashes. The wide range allowed for the amount of potash to apply is given because some soils show little response to applications of this fertilizer. In such cases the smaller amount might be used and under present conditions when it is difficult to get, it would likely be left out altogether.

Cover Crops.

Commercial fertilizer are now regularly used by the best orchardists in the Province. It is an accepted fact that the productiveness of orchards can be maintained or increased by the judicious use of fertilizers and cover crops Since barnyard manure is not as a rule available for use in bearing orchards some other means must be found for keeping up the supply of humus in the soil. Commercial fertilizers furnish plant food but not humus. One of the greatest benefits which are derived from the use of cover crops is the addition of humus to the soil. Humus is decaying organic matter of either plant or animal origin which gives to the soil its dark appearance. It is one of its most valuable constituents. It improves the tilth by making clay soils more loose and open and more easily tilled and by binding together the particles of sandy soils making such soils more compact and more retentive of moisture. It increases the bacterial content of soils and provides organic acids which act on certain mineral constituents making them soluble and available to plants. For a full treatment of the subject of Humus see Series of Articles on Soils and Soil Cultivation, published by the Department of Agriculture in 1915.

An example of the extent to which cover crops may improve the soil is given by Bailey. An analysis of a soil in New York State, on which had been grown three heavy crops of crimson clover in three successive years, showed an increase of water, as compared with a neighboring field without cover crops, of 46.875 tons per acre-foot, of nitrogen, 1,350 pounds and of phosphoric acid 105 pounds per acre-foot.

Humus can be supplied to orchard soils in this way without interference with the growth of the trees or the crop of fruit. In fact, the cover crop is directly beneficial to the orchard in other ways than in providing humus for the soil. (See page 39). In this respect the orchardist has an advantage over the general farmer in that he can plow under a green crop every year without interfering with or losing the main crop from which he derives his revenue.

Many different plants have been used as cover crops. Among these are the non-leguminous crops,—rye, buckwheat, rape, turnips, corn, wheat, oats, barley and millet, and the leguminous crops,—clover, vetch, peas and beans. Some of the non-leguminous crops may be used to precede the leguminous crops until the soil is in condition to grow good crops of legumes. They may be used in a rotation with the legumes, or to help make up a mixture when a combination of cover crops is grown. If the ground should become too rich in nitrogen a non-leguminous cover crop should be grown or the orchard might be put into sod for a time.

Crimson clover because of its rapid growth is the best suited of the clovers for a cover crop. However, if alternate strips are left in clover sod during the following year one of the other clovers should be used. Summer vetch makes a good growth by the end of the season and is a good cover crop to plow under in the fall. Hairy vetch grows until late in the fall and lives through the winter. It is a good cover crop for use in orchards which are plowed in the spring.

Combinations of two or more crops are sometimes recommended for cover crops. For example, buckwheat and rye, hairy vetch and clover, buckwheat and clover, rape and rye, and buckwheat, oats and rye are used at

Tompkin's King in Fruit.

Cover Crop of Summer Vetch.

times. Where cultivation ceases at midsummer and no cover crop is sown weeds often come up covering the ground and supplying the place of the cover crop. Where a good growth of weeds occurs it may add considerable humus and serve the purpose of a regularly sown cover crop, except that weeds are seldom leguminous.

The usual seeding per acre for cover crops is as follows:

Barley	2 to 2½	bushels.
Buckwheat	1	bushel.
Clover, red	10 to 15	pounds.
Clover, mammoth	10 to 15	pounds.
Clover, crimson	15 to 20	pounds.
Cow peas	1½ to 2	bushels.
Millet	1½	"
Oats	2 to 3	bushels.
Peas	2 to 3	bushels.
Rape	1½ to 3	pounds.
Rye	1½ to 2	bushels
Soy beans	1 to 1½	bushels.
Sweet clover	10	pounds.
Turnip	4	"
Vetch, summer	1	bushel.
Vetch, hairy	20 to 40	pounds.
Wheat	2 to 2½	bushels.

If a cover crop is intended to remain on the ground all winter to be plowed under in the spring it should consist in part, at least, of plants which will stand up through the winter and hold the snow. Millet, rape and corn are useful for this purpose.

Pruning the Trees.

Up to the time at which the orchard comes into bearing the pruning should chiefly be for the purpose of training the trees into the desired shape. The height at which the head of the tree is to be formed and the character of the head, whether with an open centre or with a leader are matters to be determined during this period. Owners of orchards may differ as to the ideal to be attained in the training of the tree, some preferring, one type of tree some another, but, in any case, this is the time during which the pruning adapted for the particular training which the owner has in view should be given. The removal of any weak, diseased or interfering limbs and any limbs forming bad crotches or limbs which destroy the balance of the top will also be performed now. But, in general, it is better that any pruning further than this be deferred until the tree reaches the bearing age. Heavy pruning before this time is likely to retard the growth of the tree and to delay the time at which it comes into bearing.

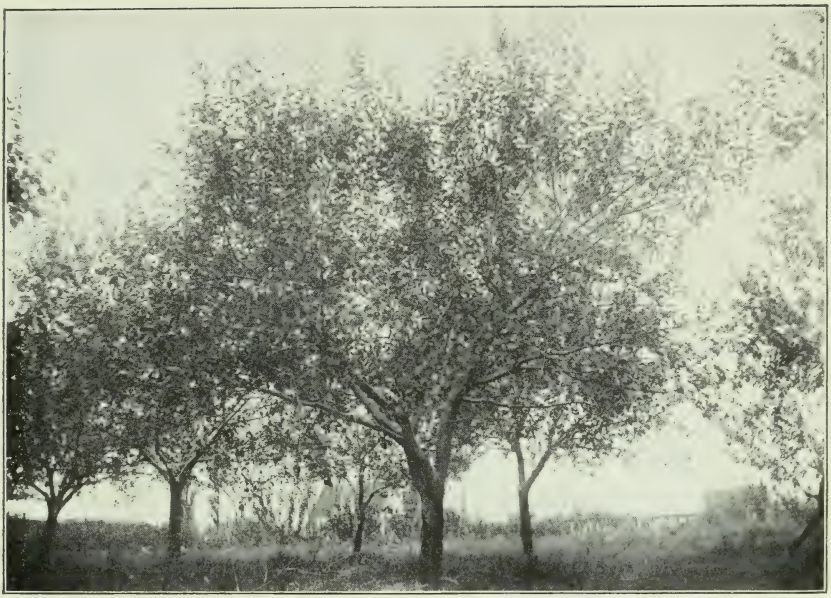
Whether the open centre type of tree or the tree with a leader is to be preferred depends partly on the taste of the owner and also on the variety of tree under consideration. The latter type is thought to make the stronger top and is better adapted to the low headed tree and the repressive style of pruning than is the former type. The open centre style of training goes well with the traditional method of pruning where the tree is allowed to reach its fullest expanse.

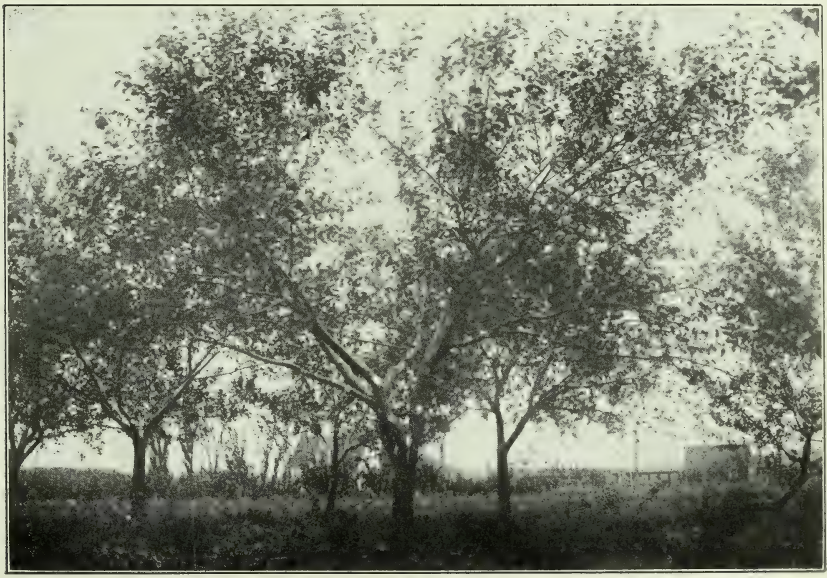
The chief object in pruning the bearing tree is to increase the size and to improve the quality of the fruit. It also improves the health of the tree and facilitates the operations of spraying and picking. By lessening the number of fruit buds and diverting more food to each specimen, pruning increases the size of the fruit. Proper pruning opens up the top of the tree, allowing a better circulation of air and admission of sunlight to the different parts. The foliage dries out sooner after rains and heavy dews than it otherwise would, thus helping to prevent the development of the black spot fungus. One effect of more sunlight is to give better color to the fruit.

Pruning is essentially a thinning out process by which the weaker and less promising branches are removed for the better development of the remainder of the tree top. Limbs which are partially shaded and likely as time goes on to be deprived more and more of sunlight are cut off. Old limbs whose places can easily be filled by younger growth are taken out, resulting in the gradual renewal of the tree top. The younger wood produces fruit of larger size and better quality.

In pruning fruit trees care should be taken not to remove more fruit spurs than is actually necessary for the end in view. Some spurs, of course, will be sacrificed in taking off the branches which need to be removed. The effect of this is merely to increase the size of the fruit which grows on the remaining spurs. But if all, or nearly all of the fruit spurs are removed there can be little or no fruit produced until new spurs appear.

The traditional style of pruning has for the most part consisted in thinning out the centre of the tree, allowing the branches to develop to any extent they would. Such pruning in time results in a tree with a very open centre and with long branches carrying the load of fruit at a distance from the vertical axis of support. A different kind of pruning consists in heading back the excessive growth of branches





Ben Davis Trees Before and After Pruning. The Open Centre Method.

each year, keeping the tree within certain well defined limits. The centre is not thinned out excessively and the whole tree top is kept somewhat in the form of a hemisphere. Trees pruned to this form are more easily sprayed and do not injure each other by the interlacing of the tops, even when thickly planted.

When apple trees have become too spreading or too high they can often be improved in form by heading back the main limbs to a reasonable length. This may require the cutting off of six or eight feet of the longest limbs. The point selected for cutting off such a limb should be just beyond where a side branch arises. This prevents the dying back of the stub and enables the wound to heal over more readily. If this method of pruning is begun when the tree is the right size it can be practised indefinitely without the least check to the health of the tree or the crop of fruit. In practising this kind of pruning the operator should each year remove in the dormant season nearly all of last year's growth.

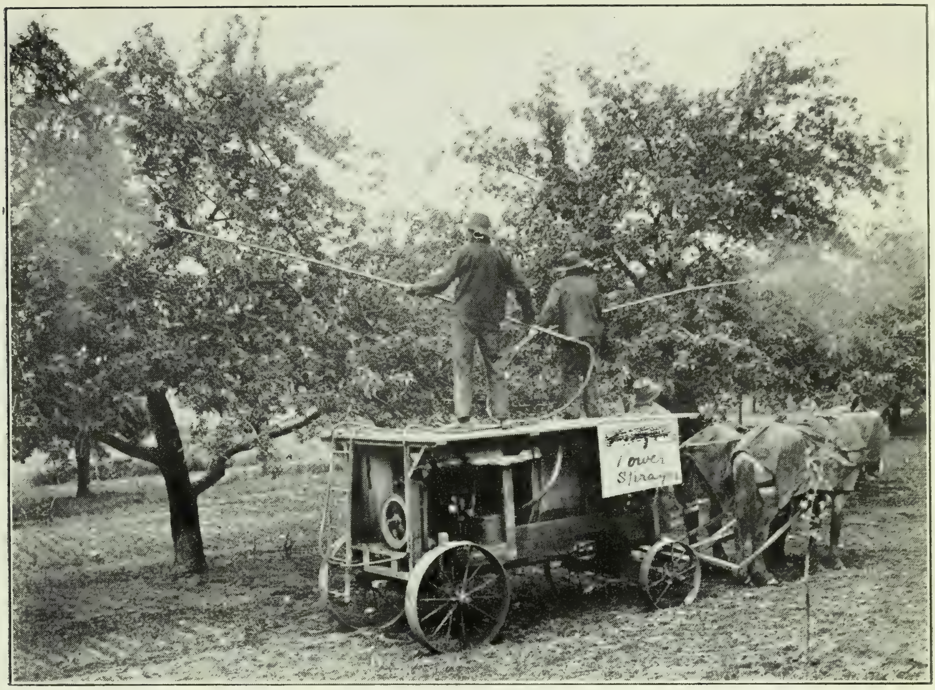
The Spraying of Fruit Trees.

The spraying of fruit trees in this Province for the control of certain insect pests was begun fully thirty years ago. A little later, Bordeaux mixture came into use for the control of the black spot fungus. The wisdom of spraying was for a long time doubted by many fruit growers. Chiefly, because to be effective, this operation must be done with intelligence and thoroughness, those who preferred not to spray easily found proof that it did not pay. After many years of trial under varying conditions, spraying has now come to be an accepted practice with all who undertake to grow fruit trees to any extent. Orchards in which fruit is grown for market are as regularly equipped with spraying outfits and material as with implements for tillage or other operations. Being the last to win its way as a necessary part of orchard work the value of spraying is sometimes over emphasized to the neglect of other operations. In general it is probably no more important in successful orcharding than is tillage, fertilizing or pruning. For the best success each of these should have proper attention. There may be seasons when the crop in an orchard would almost be a failure without spraying. In certain seasons it may not be necessary to spray at all. Since we do not know, until it is too late, what the character of the season will be, the safest way is to spray regularly every year. The orchardist will then have as good insurance against insect pests and plant diseases as, with the present knowledge, can be provided. Spraying must be done at the proper time, in a thorough manner and with the right mixture or the result will be a waste of labor and materials.

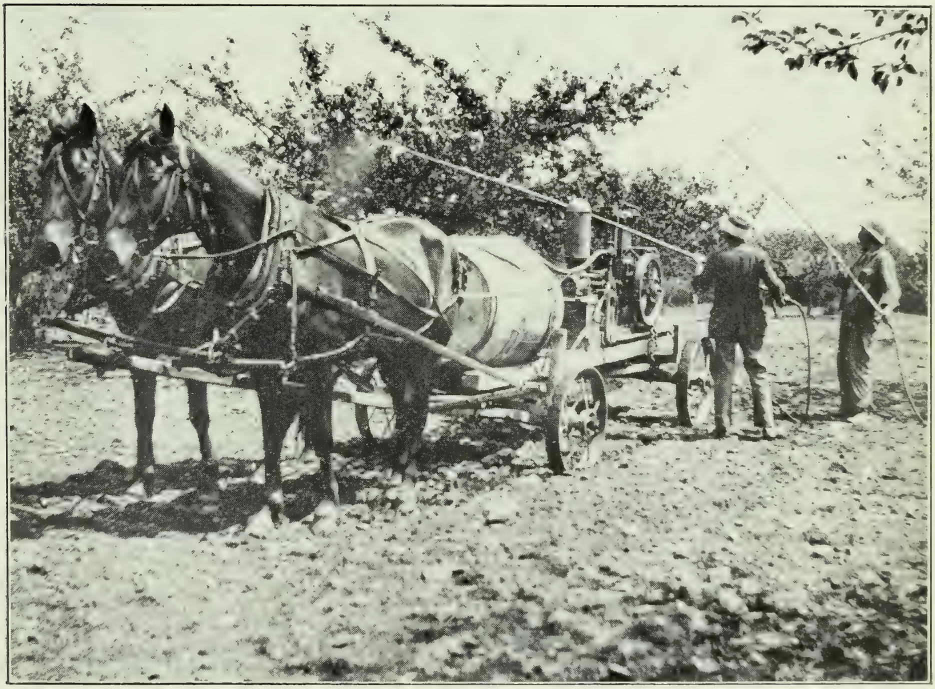
Bordeaux mixture was once the only fungicide used on fruit trees. Lime-sulphur now is the chief spray mixture used for the control of the black spot fungus. The commercial article, testing 33 degrees Beaumè, should be diluted one to forty, or more, according to the time at which it is applied. All fungicides at present in use have their defects and lime-sulphur is no exception to this rule. There is reason to believe that in the third or fourth sprays about the end of June, or first of July, when applied at a strength formerly considered safe it may cause a serious dropping of the fruit. For this reason it is diluted one to fifty, or more, for the last sprays of the season or replaced by a spray of Bordeaux mixture. For directions for diluting lime-sulphur see page 54.

The kind of spray outfit to use depends upon the extent of the orchard to be sprayed. If the orchard consists of five acres or less the hand or barrel pump will be the most economical for the purpose. This can be bought with barrel, hose, rod and nozzles, complete, for from $20 to $30. A larger sized type of hand pump with horizontal double cylinders which costs from $40 to $65 is useful for slightly larger areas. With such an outfit the spray can be put on with greater force than with the vertical single cylinder pump. For orchards of eight or ten acres or more, the gasoline power outfit is the one now generally used. Spraying can be done with such an outfit in less time and more thoroughly and more cheaply than with the hand pump. Compressed air outfits are useful on sloping land or on rough ground.

For information as to the materials to use and the time to apply the different sprays the reader is referred to the spray calendar by Professor W. H. Brittain and Mr. G. E. Sanders published in this series of articles.



Modern Power Spraying Outfit at Starr's Point.



Power Spraying Outfit Home-made Tank.

AN EXAMPLE OF GOOD ORCHARD MANAGEMENT.

F. H. Johnson, Bridgetown, N. S.

In 1899 I purchased a farm with an orchard of 300 apple trees, the greater part of them in bearing. The trees had been badly neglected, being left in sod, with very little pruning, and had never been sprayed. They were covered with moss and presented a stunted appearance. The annual crop was about 100 barrels. As soon as the land was fit to work in the spring, I had the orchard all plowed and kept thoroughly cultivated up to July 1st; then sowed to cover crop. It was given three thorough sprayings with poisoned Bordeaux. First spraying just before blossoms opened; second as soon as petals had fallen, and a third ten days to two weeks later. In the autumn three hundred barrels of nice, clean fruit were harvested. The gain has been steady from that time up to the present, with the exception of the past season, which has been about equal to the first year owing no doubt, to the unfavorable conditions in the early spring, which has caused a complete failure in many orchards through the valley.

The trees are pruned every spring, before growth starts. I have never tried pruning in June. It is a busy time of the year, and owing to the foliage, one could not see well to do the work. My present method of cultivation is to plow in the fall, after the leaves have fallen, and by plowing them under they are adding humus to the soil, and at the same time destroying any spores of the apple scab that may be on them. The land is cultivated in the spring, as soon as it will do to work, harrowing every week or ten days, up to July 1st. A cover crop of clover, buckwheat, or vetch is then sown.

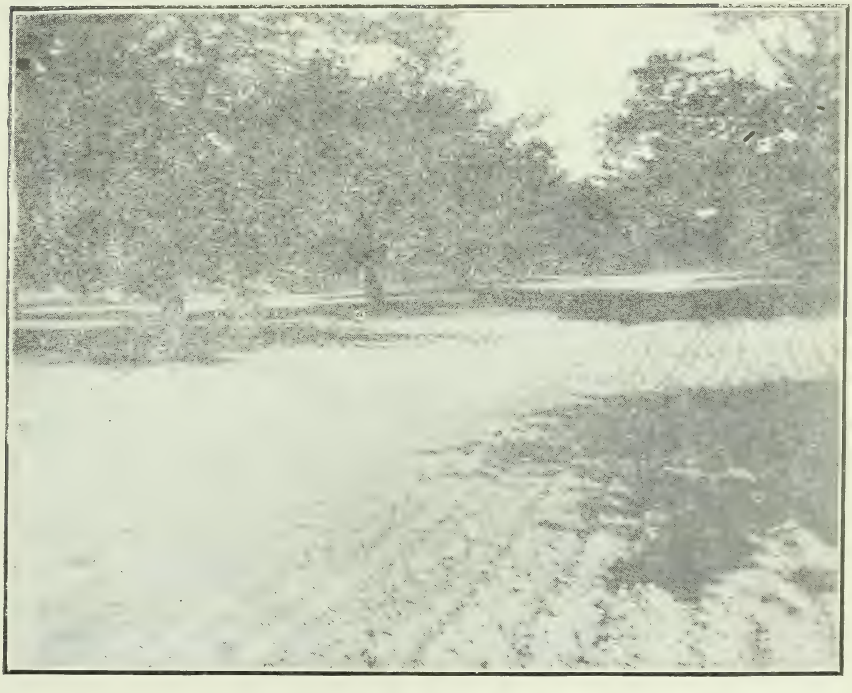
For the past eleven years no stable manure has been used in the orchard. The fertilizing has all been done with commercial fertilizers, and plowing under green crops. I am using, each season, 600 pounds of plain superphosphate, carrying 14 per cent of soluble phosphoric acid, and 200 pounds of muriate of potash per acre. A larger amount might be used with profit. I shall try some experiments along that line in the next few years. Of late years I have had to leave out the potash through necessity. A few colonies of bees are kept for the benefit of the orchard, and are proving a source of income from the honey, as well as the good work done in the blossoms. It is a well known fact that bees play an important part in distributing the pollen of blossoms. The increase of bees has not kept pace with the increase of orchards. For those who have orchards not situated near an apiary, it would be well for them to keep a few colonies.

I have practised thinning apples for several years with good results. The fruit will be larger, more even in size, and better colored, and in picking and packing can be handled much faster. It is one of the most important things to do in growing first class fruit.

For the past ten years, up to 1910, I have used Bordeaux mixture for spraying with good results as to the control of the apple scab, but I have had more or less injury to the fruit and foliage. Stark and Kings are very susceptible to Bordeaux injury on the foliage; Ribston Pippin, both fruit and foliage.

In the spring of 1909 I used lime-sulphur on the orchard as a winter spray with good results. It is very effective in cleaning the trees of oyster shell bark lice. The trees should be scraped to remove the rough bark before applying the spray, to give it a better chance to work on the scales. The past season I have used lime-sulphur as a summer spray, although the season has been the worst for fungus I have ever known. It has given fully as good results in the control of apple scab as Bordeaux, with the advantage of no injury to fruit or foliage. I have never seen the trees carry such a good foliage to the end of the season, and they have ripened up well for winter. The spraying is likely to undergo some change very soon but I would not like to make any statement about it, until further experimenting had been done. My orchard is doing so well under the present system that I do not feel like making much change.

In summing it all up, I would say give the orchard the best care possible, and you will be well repaid. It is one of the best paying crops on the farm.



Two examples of Ideal Orchard Cultivation at Bridgetown, N. S.

FERTILIZING ORCHARDS AND SOD CULTURE.

E. E. Archibald, Wolfville, N. S.

It often happens that our ordinary varieties of trees grow fairly well under ordinary treatment, and in their youthful teens occasionally give a promising crop of fruit. After trees are mature, however, some of the varieties become shy in bearing. This has been especially charged against the Golden Russet. Six or seven years ago I bought a small orchard, an important part of which was of this variety. To my knowledge, it had not given a good crop, or even an ordinary crop, for six or seven years. My first work was to thoroughly cultivate, fertilize and spray, sowing a clover cover crop each year, in July. The fertilizer used was chiefly bone meal, muriate of potash, and nitrate of soda. One year it had at the rate of one ton per acre of Bradley's orchard fertilizer. The trees the second year began to awaken, and gave me some good apples. The increase was slow, but steady, barring the year 1908, and in 1909 the plot—about one-half acre—gave me, as I picked from the trees, 108 barrels. My reasoning is that the land lacked in large measure the elements necessary to insure a crop of Golden Russets, and when I supplied them, the trees responded. It is only fair to say here, however, that, in common, with all other varieties in my orchard, 1910 has been an off year. However, a fine lot of fruit buds for 1911 has been developed, and give promise of a full crop next year. Let me state a general principle that is conceded by observant fruit growers, viz., that while the several varieties of fruit trees may be grown by uniform treatment, yet, when the bearing period arrives, some must have more fertilizer than others. This is especially true of Golden Russets, and, to a lesser extent, of Ribstons. In fact, a careful study of each variety will find some peculiarity that calls for special treatment. In the fruit valley of Nova Scotia, which means the counties of Hants, Kings and Annapolis, it is freely stated that the Spy apple is most at home in Hants County, and the Nonpareil in Annapolis County, which means that these two counties have soil conditions most favorable to the giving of the largest crops of these varieties of fruit. Kings County can grow trees as well as either.

Sod culture.—The almost universal teaching of horticulturists is annual cultivation and cover crops sown in July or first of August. This is sound teaching when applied to a young or growing orchard; but I have had good results from allowing sections of my orchard to go without cultivation alternate years, letting the clover cover crop of the previous year grow, and mowing two or three times during the season, always leaving the product on the ground for mulch. This treatment in a full grown orchard previously well cultivated will, I believe, often give better results than annual cultivation. I went further than this; about one quarter of an orchard of Gravensteins, I allowed to remain in sod for six or seven years, mowing all the grasses and leaving on the ground, and fertilizing with the same quantity as when cultivated. I had no deterioration of fruit, either in quantity or quality. My uniform treatment of bearing orchard, as to commercial fertilizer, is as follows: 500 pounds of bone meal, 200 pounds of muriate of potash, 100 pounds nitrate of soda to help out the trees here and there which are not quite up to the mark.

In 1909 I marketed about 400 barrels of apples from about three acres of bearing orchard. This quantity is not exceptional, as I know a number of orchards that did better per acre than that, but we call it good. It is not fair, however, to quote a banner year as though it were an annual record. Trees overworked will take their rest, and no treatment yet discovered and applied in Nova Scotia will keep our orchards up to the standard each year. Further, about every tenth year we should expect a lean year, such as 1910—about 25 per cent. of a full crop.

DAIRYING AND ORCHARDING.

F. W. Foster, Kingston, N. S.

At no time in the history of the Province have the prospects of these two branches of the farming industry—Dairying and Orcharding—been brighter than at the present time. The fine displays at fairs held throughout the Province, of apples and other fruits including, in some sections, such tender kinds as peaches and grapes, and the interest taken in private dairying as well as the great development of the creamery enterprise, show that the Nova Scotia farmer is awakening to his opportunities.

The personal experience of the writer may show what can be done in this Province by a man with small capital. Twenty two years ago, with one hundred dollars in cash and the experience of seven years of life in Alberta, I started to make a home and a living in this, my native Province. I have enjoyed the experience and am contented with the result.

Starting in a small way on a sixty-acre farm, I have gradually increased my output of fruit from nothing to more than one thousand barrels of apples yearly. A yield of two thousand barrels is now possible; the orchard is still young and the product will continue to increase as the years go on.

For the first ten years the main dependence for a living was on dairying. I could not keep more than six cows at the first but as time went on the increased production of the farm was such as to justify an increase of the stock. A herd of sixteen cows giving milk is now kept. From these, besides raising some young stock for sale, I have sold more than five thousand pounds of butter in twelve months.

In addition to fruit farming and dairying, I have found the keeping of swine to be an essential to a complete farming combination. My plan has always been to feed all the hay and forage crops on the farm to good stock, buying necessary mill feed for cows and hogs. Apart from direct returns, the manure from well fed stock is much more valuable than from those poorly fed. Well fed cows and well fed swine will produce the best fertilizer possible for the growing and maintaining of an orchard and for the top dressing of grass and for the production of corn and roots with which the cows and swine are to be fed. By the use of this fertilizer, the farm is gradually enriched until brought into a high state of cultivation, giving greatly increased production. This result is not easy of attainment when orcharding is carried on exclusively. Many farmers have learned through experience that it is a mistake to depend on the orchard alone and while raising all the apples they can are keeping more cattle, sheep and swine thereby securing a more steady income, as well as more effectively improving their farms.

I have always kept an account of my outlay and revenue from the farm. The account for 1915 on my sixty-acre farm is as follows:—

	Cr.		*Dr.*
Beef Cows	$ 45.00	Wages	$ 505.00
Milch Cows	300.00	Feed	1145.00
Colts	150.00	Straw	80.00
Veal	16.18	Fertilizer	90.00
Dressed Pork	537.05	Apple Barrels	287.00
Sucking Pigs	113.50	Grass Seed, etc.	32.00
Beans & Potatoes	120.00	Spray Material	40.00
Butter	1350.00		
Apples	1775.00	Balance	2227.73
	$4406.73		$4406.73

SIDE LINES TO ORCHARDING.

R. J. Messenger, Bridgetown N. S.

There are very few holdings or homesteads in the Province where the cultivated land is wholly or even largely occupied by orchard. Ninety per cent of our so called orchardists are general farmers to a greater or lesser extent and derive their income in varying measures from live stock and its products.

The Young Orchard.

Most orchardists will agree that hoed crops can be profitably raised in the young orchard, and that the expense of caring for and fertilizing the young trees for the first ten years of their life can thus be reduced to a minimum. The beginner, however, should beware of barking the small trunks by carelessness in the use of cultivating tools. This has been responsible for thousands of dollars worth of injury to young trees.

Besides its crop of apples the orchards may be made an important factor in the production of three other income yielding crops, which, while obtaining a considerable portion of their living from the orchard, are in turn a benefit rather than an injury.

Bees.

The presence of bees in an orchard with their pollen-distributing facilities is an important factor in the fertilizing of the blossoms and consequent setting of fruit. A few colonies of the busy little fellows, if properly handled will add a considerable amount to the income of the orchardist.

Poultry.

Nova Scotia *imports* poultry and eggs. In 1914 Canada imported $200,000 worth of poultry in excess of that exported.

This should not be. Poultry and poultry products are bringing higher prices every year. Poultry kept in an orchard obtain much needed exercise and also a good part of their living from worms, insects, seeds and wormy apples. They help to fertilize the orchard and keep down insect pests. To make poultry profitable fresh scratching grounds are necessary and conditions in a cultivated orchard afford the best means for keeping them economically and hence profitably.

Hogs.

Hogs in the orchard under proper conditions, make a pretty good combination. It would be disastrous to try to keep twenty hogs in a half acre of orchard. They would pack down the ground, eat up everything in sight and probably gnaw the bark off the trees.

If alternate strips in an orchard are cultivated each year, and the other strips left in clover, the treatment of these strips being reversed every year the fruit bearing conditions will be satisfactory. When orchards are treated in this way, or when rape is sown early in the season in part of the orchard, or where some of the clover is not turned under until June, hogs may get the most of their living from May until November. In this way, from five to ten shoats may be very economically grown during the summer for each acre of bearing orchard. They will partially and under favorable conditions, wholly fertilize the orchard and also keep down insects by eating wormy apples as they drop. The summer and winter run for brood sows ensures strong, vigorous litters. Details can be worked out by each orchardist according to situation and conditions. Suffice it is to say that the writer has found the above a profitable combination.

The introduction of any of these lines is not an expensive experiment. As a rule any of them will benefit the orchard, take nothing of commercial value from it, and so enable the orchard area to yield a more steady and certain income.

Mixed Farming.

The conduct of general farming outside of, and in addition to orcharding may be seen almost anywhere in the Annapolis Valley. Indeed the opinion of thinking men is yearly becoming stronger that such farming is the only safe procedure. No matter how faithful and skilful the orchardist may be, there will be off years in production due to circumstances more or less beyond his control, such as untimely frosts, wet periods during pollination, severe wind storms, poor markets etc. In other words a man may perform all the operations of pruning, fertilizing, spraying, cultivating, etc. and get barely a half crop or an income of half his average but it is a rare thing that a farmer loses the half of a bunch of hogs or steers or that half of his cows go dry if he has done his duty by them. The carrying on of two more or less distinct lines of business, while augmenting and stabilizing the income, presents its difficulties; the two principal being the addition of labor and the conflicting of the two operations in point of time, Dual purpose farmers all know what a temptation it is to postpone spraying when a certain field is just right to prepare for seeding. It looks on the face of it as if we would have to double up in teams and men. However, the farmer who thinks and plans can carry on both lines with a reasonable measure of success, providing he does not "load up" beyond his labor capacity. In this connection the writer may be pardoned if he gives some of his own experience. His sources of income are, a few bulls, pigs and fowls for breeding, cream or butter, pork, eggs, a horse or colt, a cow or two, hay, oats for seed, potatoes, beans, turnips, apples, a little here and there all through the year. To keep things going decently and in order, weather permitting, the fences are all repaired and the dryest ground worked before the first spraying is possible. The grain is put in if possible between the first and second spraying, the hoed crops between the second and third spraying, the orchards being cultivated at the same time. Then we cultivate crops, orchards, and fight weeds until time to begin haying when the orchard cultivation then ceases.

If we have done our seeding early, then harvesting grain comes right after haying and before the apples are fit to pick. Picking apples extends until about the middle of October when the potatoes, mangles and turnips are harvested in order named. So if the weather is not too cranky the farm and orchard can both be carried on with one set of labor.

As 90 per cent of commercial apples are packed in warehouses the farmer is not hampered in his fall work by packing his apples. If his fences are good and his planning wise his live stock has not been much trouble to him during the summer. After the crops are all in, the work of caring for his stock during the winter will equalize the labor, thus providing steady employment the year through. By all means then let the orchardist extend his operations taking up such side lines as his circumstances or inclinations warrant.

POULTRY KEEPING IN RELATION TO ORCHARDING.

Manning K. Ells, Port Williams, N. S.

In an orchard the conditions seem to be ideal for poultry; and by poultry in this article I mean hens, for they are the only branch of the poultry tribe with which I have had experience. I have two hen-houses, 46 x 15 feet floor space, in each of which I keep 150 to 200 hens. These houses are in a fifteen-acre orchard, about twenty rods apart. The hens have free range, no yards of any kind the whole year round. They are fed by the "hopper" system with a dry mash, made of bran, middlings, ground oats and corn meal in equal parts, and about a half part of high grade beef scraps; cracked corn, oats and buckwheat are fed in the winter, scattered in a straw litter on the floor. Four quarts of corn in the morning, and the same quantity of oats or buckwheat at noon to each hundred hens is the ration allowed. About four large turnips to each hundred hens are given each day, cut in two and stuck on a nail just high enough for them to reach easily. Dry mash is before them all the time. In the Spring as the hens roam farther afield, and the range supplies more food, this ration is gradually cut down. First one feed of hard grain is taken away. Later in the summer only the dry mash is given, and in September, when the buckwheat is getting ripe in the orchard cover crop, no extra feed is given, and until about November first, they pick up their own living. I have found this system of feeding does not suit old hens, and the last two years have killed the laying stock each summer, going into the houses in the fall with a new lot of pullets. If the ration is properly balanced, I do not think you can get a pullet to eat too much, and when one is hurt by over feeding ninety nine are stunted by not getting enough.

The south side of each house is about equal parts glass and cotton, and except in the coldest weather, the cotton windows are out or partly out all the time. The great difficulty is to keep the house dry, but with a straw loft, cotton windows, and changing the litter every ten days to two weeks there need be no trouble on this account. The droppings are collected each week and spread in the orchard some distance from the house, as the trees near the house receive all the fertilizer they need. The land should be plowed spring and fall, besides the regular cultivation of the orchard, that the manure may be absorbed, for in keeping a large number of hens in one flock the land will become contaminated and poisonous to the fowls if you are not particular in this respect.

Fifty hens will furnish all the fertilizer an acre of orchard requires. So, if the poultry will pay for the feed, one problem in orcharding is solved, and artificial manure can be left to the other fellow. To show that the fowls will pay for their feed, here follows my last year's showing:

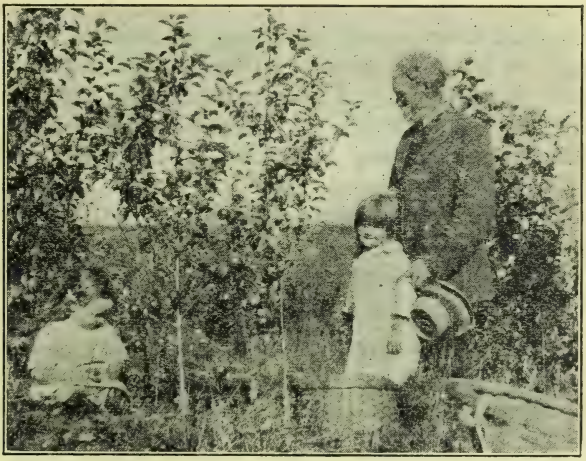
Cash for eggs, from Nov. 1st. 1909, to Nov. 1, 1910		$246.70
Cash for fowls sold		173.03
Cash for chickens sold		85.00
Pullets on hand		100.00
Poultry and eggs used in the house		50.00
		$654.73
Cash paid for feed	$260.00	
Poultry on hand, Nov. 1st, 1909	130.00	
		$390.00
Net profit		$264.73

No credit is given for the manure, which may be fairly put against the care. Now, as to the indirect profits. Two and a half acres of orchard near one house is now out twenty one years; one hundred trees in the orchard. This has had no fertilizer, except from the hen house, for five years. In 1907 the apples sold for $350, in 1908 for $600, in 1909, $908, and this year (1910) there was a scattering crop. These trees are in as vigorous and healthy a condition as any orchardist could ask for, and give promise of abundant returns in the future. Buckwheat has been sown every year in July as a cover crop, the hens getting their living from it the latter part of the summer. Quite a large quantity of straw has been used in this house as scratching litter, and this has greatly added to the amount of humus in the orchard. Strange ideas are held by those that have had no experience of the amount of work required to care for a flock of poultry, but handled under the conditions I have written of here, two hundred hens can be cared for with half as much labor as four cows and the returns will be greater. The growth of the tourist trade and the higher standard of living will furnish a market for a great increase in the production of poultry products. With the large acreage in "the valley" now being devoted exclusively to orchards, many could give a share of their attention to this branch of stock husbandry with a great increase not only of profit, but of pleasure as well.

AN ENGLISHMAN'S EXPERIENCE IN FRUIT FARMING.

Henry Watts, Waterville, N. S.

We came to Nova Scotia from England in 1897. The farm to which we came was the poorest one in this neighborhood. Some trees in the orchard were dead; others were lying on their sides; some were producing natural fruit; others, and the largest trees too, were bearing such crooked and spotted specimens of Bishop Pippins that they were almost unsaleable. The Bishop Pippin trees were grafted to Blenheims and Starks. Those lying on the ground were set upright and pruned, and, at the proper time, sprayed. The orchard was so full of couch that it was difficult to plow.



York Imperial 4 Years Old Bearing 34 Apples in the Nursery.

The first year we managed to plant a few beans, turnips and potatoes. The whole crop amounted to half a bushel of beans, about nine barrels of turnips, nine barrels of potatoes and twenty five barrels of apples. The next year a larger piece of beans was sown, but the man I bought them from gave me old seed, and very few grew. However, we had enough seed for the next year and we planted it in the orchard. The trees were benefited by the cultivation given the bean crop. This crop was followed by buckwheat and red clover, the latter being plowed under in the following spring. Since the trees are now too large to grow beans under, vetches and sometimes buckwheat and clover are grown. The apple crop has been fairly satisfactory, except in the two years when the blossoms were injured by frost. I have now about seven acres in bearing, trees from 30 to 40 years old, from which I have been getting about 200 barrels a year, on an average. This low yield is accounted for by the large number of trees which have been grafted into new varieties. From now on a larger yield is expected, as the grafted trees have begun to bear. In spite of the frost injury to the blossoms, about 100 barrels were picked in 1910.

After the other lines of farming were well under way, a small nursery was started. The seed obtained from wild apples, which had been ground in a cider mill, were planted in the fall. As soon as the seedlings were large enough, they were cultivated with a spike tooth cultivator, and hoed throughout the summer. Just before hard frost set in they were dug, and stored in the cellar, and grafted the latter part of February. They were then stored in sawdust, and planted out, as soon as the soil was warm enough, in rows about three and a half feet apart, and ten to twelve inches apart in the rows. A liberal amount of barnyard manure was apapplied and plowed in. The ground was then harrowed and the furrows struck out. A line was stretched, and some good fertilizer sown along the row. The root grafts were planted along this line and kept carefully cultivated and hoed. Some trees were lost by cracking at the butts by the early frost. The wood not being well ripened, vetches were sown to check the growth, and the results were very satisfactory.

As the demand for nursery stock has increased so much, the stock of home-grown seedlings was not sufficient, and 10,000 seedlings were imported for my nursery in 1910. The demand for dwarf trees is also increasing. The tendency of orchardists is to plant younger trees than formerly, 1 to 2 years old being preferred for budded stock, and 2 to 3 years for grafted stock. The varieties mostly enquired for are Stark, Wagener, Duchess, Ontario, Wolf River, King, Wellington, and Williams' Favorite. A little prejudice seems to exist against budded stock, but for the first few years of their life they certainly make better trees than grafted ones, though perhaps it is only until the latter have grown their normal amount of roots. A few years ago trees were in demand trimmed high enough for a horse to walk under. Now those trees would be unsaleable.

Several hundreds of red and sugar maple, also elm, Douglas Fir, weeping willow, spiraea, weigelia, cryptomeria, scarlet thorns, Wellingtonia and chestnuts have been planted, but as yet there is not demand enough to justify the further planting of this kind of stock in the nursery. Plum

Orchard Scene in Nova Scotia.

Apiary in Orchard, owned by Mr. Watts, Waterville, N. S.

trees have been planted for home use, and only about a dozen are sold from the nursery for every thousand of apple trees. As so many plum trees have died of black knot, and so few are being planted, I think the demand for this fruit will soon be larger than the supply, and have accordingly planted about two acres. A few trees have borne, and a crop is expected next year.

From 23 colonies of bees about 600 pounds of honey was harvested. Three colonies were sold, leaving the same number as last year. Roughly estimated, the crop and stock for disposal this year is as follows:

800 bushels of turnips.
150 bushels of carrots.
3 waggon loads of cabbage.
1 waggon load of pumpkins.
Hay for home use.

Bees and honey	$ 87
Beans	50
Tomatoes	40
Sweet corn	20
Strawberries	20
Apples	200
Nursery trees	1,000
Pigs	94
Horned stock	100
3 colts	190
	$1,801

During the past five years cows have given from 7,000 to 9,160 pounds of milk each. Poultry and eggs for home consumption have been furnished by the farm. The following improvements have been made since the farm was bought in 1897: Bushes were cleared from the meadow, and about 20 acres were plowed, leveled and re-seeded. Bushes were cut from the pasture. The old orchard of about 8 acres was replanted where it was needed, trees were righted up and stumps removed. About 15 acres of new rocks blasted and apple trees planted. A nursery was established. Barns and outbuildings were altered and repaired. Two new houses with ten rooms each were built. A wind mill was erected, a system of hot and cold water was installed and a telephone put in.

APPLE GROWING IN NORTH QUEENS.

Josiah Smith, Brookfield, Queens County.

Agriculture in North Queens is now considered more than a mere means of living from hand to mouth. Before the Caledonia branch of the H. & S. W. Railroad was completed the local market at the shire town thirty miles away was practically speaking the only one thought of. Our farmers live on farms that were made with the hard labor of years and had not the start that nature gave the fertile valley running between the North and South Mountains. You can understand what were the difficulties and disappointments we in North Queens had to contend with as farmers. And hence the temptation to neglect the farm for the forest was almost general. However, whether because the timber limits have been depleted or because we are more enlightened—the latter I trust is the true reason—we have now settled down to the business of farming in as up-to-date a manner as possible. We pay more attention to our soils, we look carefully after our orchards and are increasing them with the best varieties of trees and we are beginning to realize the benefit of quality as well as quantity in this important branch of agriculture. North Queens soil treated intelligently is capable of producing, and does produce, fruit that commands a first class price in the markets of the world. The years 1911 and 1912 were banner fruit years and our farmers were much encouraged to put forth greater efforts along the line of fruit growing. In 1913 the North Queens Fruit Packing Company was formed with about seventy members and an authorized capital of $4,000. A warehouse was built at Caledonia large enough to serve the needs of the district for some years to come. This was a long step towards better care of our orchards generally and the prospects for more and better fruit and better returns seemed good. We have been somewhat disappointed by short crops in the last three years, and especially this year when the crop was away off. Neither have the returns for apples met the expectations so hopefully looked forward to which may also have caused some discouragement. I am satisfied however, that these little set backs with the attendant mistakes will not discourage our farmers from putting forth greater efforts to make North Queens an up-to-date apple growing district.

VARIETIES OF APPLES.

R. W. Starr, Wolfville, N. S.

It is sometimes useful as well as interesting to look back to the commencement of a successful industry, and trace the different steps by which it has made progress. It is particularly so in regard to the history of apple growing in this valley of Kings and Annapolis, as a commercial business. To do this we must look up the varieties which have been most popular and profitable to the orchardist, and best suited to the markets. Find out what we can of their origin, how long they have been on trial, note the changes from decade to decade, and what their present standing is with both growers and consumers. But before going into this, it may be well to explain the position in which the first settlers on the lands of the deported French Acadians found themselves with regard to fruit, especially apples. The country had been vacant for some five or six years. The old French gardens, usually stocked with fruit trees, were growing wild. The fruit, falling on the ground, or carried into the bushes by birds and squirrels, had thrown up seedlings everywhere. So that those who wanted to plant orchards, had only to select from those natural nurseries at the expense of digging only. Many years after, the poorest of these seedlings were grafted to better sorts, some of which remain as standards to the present time.

Among the first to commence grafting in Kings County was Colonel John Burbidge, an Englishman, who settled near Town Plot, in Cornwallis, in 1764. He imported scions of several varieties of apples from his old home in England. One of these was the

Nonpareil.

This variety he grafted on a number of the young trees in his orchard by cutting off the trunk two or three feet above the ground and inserting scions. Several of these trees are still alive and healthy, bearing good crops, and plainly showing, at the present day, the union of stock with scion. One of these he set on the glebe, where it now stands on the lawn, just south-west of the house, a very large tree. The rector, Mr. Wiswell, removed to Wilmot and Granville. Getting a grant of land in Wilmot, he planted an orchard and introduced this apple in both townships and it is more commonly grown in Granville and Annapolis now than in Cornwallis.

Downing describes this apple as Roxbury Russett, and claims it as a native of Massachusetts. I have received the Rox Russet trees from four reliable nurseries in the United States, and have grown and fruited them alongside the Nonpareil. I can find no difference; it is the same apple, and has always been known as Nonpareil in Nova Scotia. All the other varieties introduced by Burbidge have gone out of cultivation except

Golden Russet.

This has had the prefix "English" added to distinguish it from the Golden Russet of Western New York. This apple should not be lost sight of, as it is a first-class table variety. Downing said of it; "It is the best and highest flavored apple sent me from Nova Scotia." It does not seem to have been a favorite among growers, perhaps because of its rather feeble growth in both nursery and orchard. This may be remedied by top grafting on more vigorous stock, when it may prove profitable, and help to fill the growing demand for a higher class of apples for table use.

Yellow Bellefleur, or Bishop's Pippin.

This apple was introduced by the first Bishop of Nova Scotia, Dr. Charles Inglis, who received a grant of land in Aylesford in 1790, which he named "Clermont" and at once commenced to improve by clearing, building, and planting orchards. Tradition says that he imported this variety from his old home on Long Island, New York. When it came into bearing its value was speedily recognized, and it was rapidly spread under the name "Bishop's Pippin," its proper name being lost or neglected. It was found to do well on the light sandy soils of the mid-valley, and took a leading place in the markets of that day.

When the Fruit Growers' Association was formed in 1863, an effort was made to trace its origin and to get the proper name. It was found to be an old French variety, well known and largely grown in Normandy, from whence it is exported to London in quantities. Downing claims on the authority of Coxe that it is a native of New Jersey. This was evidently a mistake of Coxe, who wrote in 1817. The apple was probably brought from France, by the Huguenots, who settled at New Rochelle, on Long Island, bringing with them fruits from their old homes.

The old Prince Nursery, which was established about 1730, propagated some of the best of these fruits, and it is more than probable that the Bishop got his trees there.

This apple has a very wide range of usefulness on this continent. On the Atlantic coast it is grown with success from the Deleware to Prince Edward Island, and on the Pacific from California to British Columbia. It has several serious faults, it bruises easily, and is quite subject to "black spot." But careful handling, and thorough spraying will reduce that to a minimum. It may not be best for export, but will always be wanted for home markets, during its season.

Ribston Pippin.

This is an old Yorkshire apple, very highly esteemed in England for table use and also for the kitchen, being one of the best for making apple jelly, as it does not lose its rich, aromatic flavor in cooking. It does best on well-drained clay loams or on lime-stone soils, as it is rather susceptible to drouth on sandy soils. With good cultivation, it is an annual, good, but seldom heavier cropper, and can usually be depended on for good returns. It was first introduced by the Hon. Charles R. Prescott, of Starr's Point, in 1814, who imported a tree from the gardens of the London Horticultural Society, and planted it in the centre of a shrubbery or pleasure ground in the front of his house. This tree was especially well cared for during the life-time of Mr. Prescott, who used to point to it with pride as the parent of many thousands of Ribston trees in the province. At his death, in 1859, the property passed into other hands. The old tree was neglected and died in 1881.

Blenheim Pippin.

This fine old apple was first grown at Woodstock, Oxfordshire, and brought into notice about 1818 or 1819. It was brought here by Mr. Prescott, with a number of others in 1829. It did not come into favor as rapidly as Ribston, as it is not an early bearer, but requires more age. It is now considered one of the best commercial varieties in this part of the Province. It has many qualities to recommend it to the orchardist, and not least is its freedom from black spot on both leaf and fruit. It is a favorite in the English markets, if sent when firm and hard, but must not be held too long, or it will deteriorate. Another apple, which was imported by Mr. Prescott about the same time, and which is worthy of more attention than it has received, is the

King of the Pippins.

One of President Knight's seedlings, an apple of very good quality, and wanted on the English markets. It does not make a large tree, and requires high cultivation to get the best results. It would make a good filler, as it is an upright grower and an early bearer. It should be headed low.

Gravenstein.

This famous apple was also first introduced by Mr. Prescott, who received scions from London, in 1835, and fruited it in 1838. The following spring he gave scions to Richard Starr and to Mr. C. C. Hamilton. Through them it rapidly became known throughout East Cornwallis, and was generally grafted on old bearing trees, which soon produced fruit. Small quantities of the fruit soon began to appear in the Halifax market, and was quickly bought up, with earnest enquiries for more. This caused still more rapid grafting of old orchards, until, in 1850, there were few orchards in Cornwallis that had not several trees top-grafted with Gravenstein. As the fruit became better known in the markets, the demand increased, and was supplied under many difficulties of transportation by wagons.

In 1855 the railroad from Halifax reached Windsor. Then small schooners sailed from every port and river in Eastern Kings, delivering their freights to the cars at Windsor for Halifax. This better means of transportation gave a great impetus to fruit growing, and the increasing demand for Gravensteins placed them in the lead with growers throughout the whole Valley.

It is said to be a native of Gravenstein, in Holstein, North Germany. It is well known and widely disseminated from Denmark, through Switzerland and Northern Italy. It was first noted in the transactions of the London Horticultural Society in 1822. It is grown in several States of the Union, in Ontario and British Columbia and to a limited extent in New Brunswick and Prince Edward Island, but seems to be more at home and give better results in these counties of Kings, Hants and Annapolis than anywhere else in the world.

Baldwin.

This apple, which is probably the most popular and best known of all the American varieties, was found many years ago, a chance seedling at Wilmington near Lowell, Mass., but it was not until 1784 when Colonel Baldwin introduced and propagated it that it became more widely known and was called by his name.

It was first brought into Cornwallis by Prescott, in about 1820, and soon after was grafted in the old Starr Orchard. It is more than probable that it was brought into Annapolis or Granville by the Bents, or Gesners, previous to this date, but we have no record of it. It has been very generally grafted and planted by orchardists, praised by some and condemned by others, but today there are more bearing trees, and more barrels of this variety to export, than of any other from these three countries. It does best on warm dry soils with southern exposure. On cold clay loams, it does not color well, and it is wanting in flavor. It needs careful spraying to keep down the black spot.

Rhode Island Greening.

Supposed to have originated near Newport, in Rhode Island, as early as 1748. It is contemporary with and nearly as well known as Baldwin. It was brought into Cornwallis with Baldwin, by Prescott, but I have been told that it was grown in Granville previous to that date, 1820. It was for some years rather neglected, but latterly its value is better recognized both by growers and in the markets. As a winter cooking sort it has few equals and is a fair table apple, preferred to Baldwin, by most connoiseurs, for either purpose. It is a stronger grower, good bearer, and fair keeper, but should be placed in cool storage as soon as taken from the tree. It is well liked in the English markets wherever a green apple is wanted.

Tompkin's King, Commonly Called King.

One of the handsomest and quickest selling of any of the standard varieties grown here, and always wanted in London for the Christmas and holiday market. It needs a warm, deep, well-drained soil, with high, but early cultivation, to ensure well-ripened wood in order to get good and regular crops and prevent winter injury to the tree. It is supposed to have originated in Warren County, N. J., very many years ago. From there it was taken to Jacksonville, Tompkins County, N. Y., and in 1845, Elwanger & Barry of Rochester advertised trees for sale.

Somewhere about 1855, the late Judson D. Harris, of Belcher Street, Cornwallis, got trees from Maxwell, of Geneva, N. Y., and showed the fruit at some of the first exhibitions of the Fruit Growers' Association. Its size and beauty recommended it as one of the best for market, and caused it to be quite largely planted, and with proper care it has been a marked success in most parts of these counties.

Golden Russet of Western New York.

There seems to have been much confusion of names in describing the different varieties of Russets. Downing thinks that this is the variety described by Ronalds and Lindley as English Golden Russet. That may be, but it is not the same variety as that brought to Nova Scotia by Colonel Burbidge as Golden Russet, but it is useless to attempt to trace them further as they seem both to be old English varieties grown on this side of the Atlantic for years. This is one of the best long-keeping dessert apples, and is always in demand in the spring, both here and in England. It seems perfectly hardy, and has a wide range of growth. It requires high feeding, good soil, and an admixture of other varieties blooming at the same time to ensure proper fertilization. Then it will give fair crops, but it is frequently condemned as a shy bearer where other varieties, under the same conditions, give good crops.

Fallawater.

This large, handsomely formed apple was first grown in Bucks County, Pennsylvania. Downing described it, in 1845, as a favorite apple in that state. Warder in 1868, says of it: "Extensively cultivated through the West." Scions were sent me by D. W. Beadle, Secretary of the Ontario Fruit Growers' Association, in 1862, and were grafted on one year seedlings in the nursery. In three years they were set in the orchard, and in 1859 gave some fruit. We found them continuous bearers, and good yielders, and as grown here, rating with long keepers. The first shipments to London brought high prices, and caused them to be propagated quite rapidly, and the Fruit Growers' Association classed them among the standard varieties. The trees make very vigorous growth, but are found to be short-lived unless top worked on some hardy stock. The fruit is used for decoration show, and cooking, being too large and coarse fleshed for table use.

Northern Spy.

This variety originated at East Bloomfield, N. Y., about the first of the last century, but did not attract much attention until about 1840, when it was recognized to be a valuable winter fruit, and taken up by nurserymen and orchardists. In 1852 the American Pomological Society listed it as a new variety, worthy of general cultivation. Prescott imported it from Boston shortly after, and by grafting it on a bearing tree, got fruit the year before he died. J. D. Harris imported Spies at the same time with Kings, but because they were slow in bearing, growers did not receive them with favor at first, but as the trees got age and well grown they were found to bear well and to be hardy. As they are partially self sterile, and are late in blooming, they need to be planted near other late blooming sorts to insure fertilization. They need very careful handling, as they bruise easily. They are becoming a favorite in the local market, and the demand is now sufficient to take the whole crop at the highest prices.

Stark.

The first official notice we have of this apple is from Warder, in 1867, who gives a very short description, and claims that it originated in Ohio. Beadle sent me scions from Ontario on the same date with Fallawater. I fruited it a few years later, and exhibited it at meetings of the Fruit Growers' Association. It seemed to take the fancy of growers, and was found to keep better than Baldwin. It has a good habit of growth, and is a good bearer, with but little refuse. It is very hardy. Of late years it has been quite largely planted, to be used as stock on which to top-work the more tender varieties as Fallawater, King, etc. As a market variety, it sells with Baldwin in London. As to quality, as grown here it ranks good, nearly very good.

Cox Orange.

This excellent dessert apple is said to have been grown in Bucks County, England, from seed of Ribston, in 1830. In 1865 the Fruit Growers' Association received a box of scions from the London Horticultural Association, and among the varieties was Cox Orange. At first it did not seem to succeed. Unfortunately, it was grafted on a tree standing in heavy, undrained soil, that was not suitable for it. Later it was found to do better on warm, well-drained soil. It is not a very strong grower; requires good cultivation and feeding. Of late years it is becoming quite popular because of the extra good prices obtained and the constant demand for it in the London Market.

Fameuse. (Snow, Pomme de Neige.)

This French Canadian dessert apple has been grown in Quebec ever since the first planting of orchards in that province. Its exact origin is not known, but it is generally conceded that it was produced from seeds brought from France. We cannot think it a French variety, as none of the old French lists mention or describe it, but there is one very old French apple, "Court-pendu-plat," that resembles it close enough to be a member of the same group or family, and is probably the parent of the Fameuse. Prescott imported it, but did not think it equal to Fameuse, and it was discarded a number of years ago.

Fameuse is a hardy, long-lived tree and a good bearer, but it is subject to scab and requires careful and persistent spraying to get good, clean fruit. As a dessert fruit it has few superiors in its season, but it cannot be recommended for culinary use.

McIntosh Red.

This apple must be placed in the Fameuse group or family. It is a good, strong grower, hardy and healthy, but like all the group quite susceptible to scab. It was first noticed as a chance seedling in Dundas County, Ontario, and was propagated and sent out by Allan McIntosh, under the name of McIntosh Red, somewhere about 1870. Shortly after it was introduced into Hants, and the fruit was shown at the Halifax Exhibition about 1880, but although the fruit was handsome and the quality "very good" or "best", it did not seem to find favor with commercial orchardists, because of its tendency to scab, and being tender in flesh, it would not be a good carrier for long shipments. Lately it has been found to succeed in Eastern Nova Scotia, in Prince Edward Island, and in many counties of New Brunswick. It is well liked in local markets if carefully sprayed and handled, but should be boxed, rather than barreled, for foreign shipments. It is undoubtedly one of the best of the hardy winter table apples.

Oldenburg. (Duchess of Oldenburg.) New Brunswick.

This is one of the most popular and widely-known of the hardy Russian varieties. It was first described in the Report of the London Horticultural Society in 1831. Manning noticed it in 1838, Downing in 1845. Since then it is generally listed by all nurseries in the United States and Canada. It is an early and prolific bearer, and seems to succeed wherever apples can be grown. It is at its best in September, but with cool storage can be kept through October. It carries fairly well, and is liked as a culinary variety. Several car loads have been shipped from this valley to South Africa with success.

Ontario.

Originated by Charles Arnold, Paris, Ontario, by crossing Spy on Wagener. Noticed first in "Horticulturist," in 1874. The tree is a vigorous grower and a very early bearer. For this reason it is much used as a filler. The fruit is much the shape of Wagener, but larger, and somewhat ribbed like Spy. It is prolific and hardy, blooms quite late, and this year has usually given full crops where many other varieties have failed. It is a good keeper, rather acid for table, but first-class cooking.

Wagener.

When well grown is one of the best mid-winter varieties, combining bright red color, fine flesh, high flavor, and general good quality, both for dessert and cooking. When young, it grows quite rapidly, and commences to bear early, but never makes a large tree, being rather dwarfish in habit. For this reason, it is frequently headed low, and planted as a filler between the stronger growing standards. It is rated as rather short-lived, and needs to be well fed, else it makes but little new wood, but goes on bearing until it is exhausted.

It is supposed to have originated at Pen Yan, Yates County, New York, many years ago, but was not much noticed until about 1860, when it was described by the State Agricultural Society, and recommended for cultivation. It then became listed in most of the United States nurseries, and has, of late years been quite freely planted. It is well liked in local markets, but as yet has not for some reason taken the place it deserves in the markets of Great Britain.

Wealthy.

This is one of the most valuable apples for northern climates, or where very hardy varieties are required. The tree is of good habit of growth, and bears early and well. The fruit is medium size bright red, good form, and with ordinary care can be kept until midwinter. It is of good quality for either table or kitchen, is liked in local markets, and is slowly growing in favor in England. It is quite largely planted in Eastern Nova Scotia, in Prince Edward Island, and in New Brunswick, and is usually reported as giving satisfaction. It was originated and named by Peter Gideon, of Minnesota, and is said to be from seed of the Cherry Crab. It was first described and brought into notice about 1869 or 1870, and is now listed by most nurserymen.

Alexander. (Emperor.)

This large, handsome Russian apple was first brought into Nova Scotia by Mr. Prescott, with the Gravenstein, by scions from the London Horticultural Society. Its quality not being good enough for table use, it did not become popular at first, but as time passed and its hardiness and good bearing, with more than fair culinary qualities, became known to orchardists, it was more generally planted, and found to succeed where many of the standard sorts proved tender, as in Eastern Nova Scotia, Prince Edward Island and New Brunswick. As a market variety it has proved good. It carries well for a large fruit, and its fine color, good form and size recommend it to the ordinary buyer. In harvesting the crop, it will pay to go over the trees and take off the large, early-ripening fruit first, leaving the medium and small-sized apples until quite late, when they will be found much larger, and will keep fairly well as a winter apple, and the quality be much improved.

Ben Davis.

The origin of this apple is not positively known. It has been claimed by Virginia, Tennessee and Kentucky, but not one has proof of origin. It has, perhaps, a greater range of success than any other known variety. Its quality is best in the South and South West, but even then it is only a good culinary apple, with handsome appearance and long-keeping quality. As grown here it is not as large nor as highly colored, but yields good crops, and seems to suit the London buyers in March and April, for the costermonger trade, and brings fair prices. The tree seems hardy all through Nova Scotia, New Brunswick and Prince Edward Island, and is of good habit of growth with strong branches. By being late in bloom, it is apt to have an advantage in this climate, and is a good companion to set with Spy, to aid in cross-fertilization. Most growers regret the want of quality in this apple, and are looking for a time, not far distant, when the markets will require something better in the late season. And when found, then Ben Davis will be grafted out.

Dudly. (North Star, Erroneously.)

This large, handsome apple is proving very hardy and productive. It does not make a large tree, but is vigorous, and bears early, and is very generally liked wherever planted. It originated with J. W. Dudley, Aroostook County, Maine, from seed of Oldenburg. It shows its parentage, but is a much better variety for commercial purposes, as it keeps and carries fairly well, and is liked in the markets for culinary purposes, but is rather acid for the dessert. Its season is about with Gravenstein. It was first known as Dudley's Red Winter but about twenty years ago it was introduced and boomed by a Rochester nursery as North Star. This name could not be allowed, as it had previously been given to another variety, so its first name, shortened to Dudley, was listed by the American Pomological Society.

Wellington.

An old English variety, quite largely grown in some of the shires as a first-class culinary apple. It is always in demand in the markets and brings the highest prices. Scions were sent to the Nova Scotia Fruit Growers' Association by the London Horticultural Society with Cox Orange, but as the fruit seemed rather susceptible to scab, it did not come into favor with growers at first. As spraying became general, and a few barrels of good, clean fruit were sent to London bringing high prices and a request for more, the cultivation is increasing. The tree is vigorous, hardy and productive, fruit medium to large, greenish yellow, with blushed cheek. It will keep till March.

Baxter. (La Rue.)

A large, bright red fruit, as handsome as King, hardy, and can be grown North where King fails. It is supposed to have originated near Brockville, Ontario, some hundred years ago, but did not receive much attention until about twenty five years ago, when it was shown at exhibitions. It then found its way into the nurseries, and has been quite largely planted. Its season is about the same as that of King. Its quality is not quite as good.

Hubbardston.

This apple is a native of Massachusetts, and evidently should be classed with the Ribston family, as it has many similar characteristics, both of fruit and tree. It is usually found to be more suitable to light, sandy soils than Ribston, as it will stand drought better, does not drop its fruit so much, by permature ripening, on such soils. It is usually well liked by the commercial orchardist, and is rapidly coming into favor in the markets. Its season is much the same as Ribston, and should not be held much past Christmas. It is a good and regular bearer if well fed and cultivated, and seems perfectly hardy throughout this valley, and will likely succeed wherever the Ribston does well. It should not be allowed to hang too late on the tree, and should be immediately placed in cool storage until shipped, as it will not stand much heat.

VARIETIES OF APPLES GROWN IN NOVA SCOTIA.

P. J. Shaw.

More than two thousand varieties of apples have been cultivated in America. Of this number, probably less than thirty are worthy of consideration in planting an orchard in this Province. If the orchard is for commercial purposes ten or twelve of the best varieties which mature so as to have the picking and marketing distributed over as wide a season as possible should be chosen. Some persons would reduce the number to less than ten. If the varieties are selected for home use the number might well be more than ten or twelve. The following is a partial list of the varieties of apples grown in Nova Scotia:—

Alexander (Emperor)
Allington Pippin
Arabka
Arkansas Beauty
Baldwin
Baxter
Ben Davis
Bethel
Bietigheimer
Bismark
Blenheim Orange Pippin
Bottle Greening
Borkins
Bough Sweet
Bramley Seedling
Calkin Pippin
Canada Baldwin
Canada Red
Chenango Strawberry
Clayton
Clyde Beauty
Charles Ross
Colvert
Cooper Market
Cornish Aromatic
Cox Orange
Cranberry Pippin
Crimson Beauty
Duchess
Dudley
Danvers Sweet
Delicious
Early Harvest
Esopus Spitzenburg
Fall Pippin
Fallawater

Fameuse (Snow)
Gano
Gilliflower
Gideon
Gloria Mundi
Golden Pippin
Golden Russet, (American)
Golden Russet, (English)
Golden Sweet
Gravenstein
Grimes Golden
Haas (Fall Queen)
Honey Sweet (Winter Sweet Paradise)
Hubbardston
Hublon
Hunt Russet
Hurlbut
Ingram
Jacob Sweet
Jenneting
Jersey Sweet
Jewett Red
Jonathan
Jones
Kent Pippin
Keswick Codlin
Kitchener
King
Lady Finger
Lady Sweet
Late Strawberry
Longfield
Longworth
Louise (Princess Louise)
McIntosh
McMahon
Maiden Blush
Mann
Mother
Newton Pippin (N. Y. Pippin)
Nonpareil (Roxbury Russet)
Northern Spy
North West Greening
Ohio Pippin
Ontario
Orange (of New Jersey)
Patten Greening
Pewaukee
Peck Pleasant
Pennock
Pine Apple
Porter Pippin
Pound Sweet
Pumpkin Sweet
Red Streak
Red Sweet Pippin (Moore Sweet)
Red Russett
Ribston Pippin
Rolfe
Rome Beauty
Rose Red
Salome
Scarlet Pippin
Scott Winter
Seek-No-Further (Westfield)
Shackleford
Shiawasse
Smokehouse
Stark
Sutton Beauty
Swaar
Swazie
Sweet Greening
Tolman Sweet
Thompson
Twenty Ounce (Cayuga Red Streak)
Twenty Ounce Pippin
Vandevere (Newton Spitzenburg)
Victoria
Wagener
Wealthy
Wellington
Western Beauty
White Apple
White Graft
Winesap
Williams' Favorite
Wilson's Red (Red June)
Winter Banana
Winter Bough
Winter Pippin
Wolf River
Yellow Bellflower (Bishop Pippin)
York Imperial

Varieties of Apples in Nova Scotia.

Of the above varieties, the following, arranged approximately in the order of ripening, are of commercial importance in the fruit district of Nova Scotia. Crimson Beauty, Yellow Transparent, Red Astrachan, Duchess of Oldenburg, Williams Favorite, Wealthy, Gravenstein, Dudley, Alexander Wolfe River, McIntosh, Blenheim, Ribston, King, Bishop Pippin, Wagener, Cox Orange, Wellington, R. I. Greening, Baldwin, Stark, Northern Spy, Fallawater, Golden Russet, Nonpareil, and Ben Davis.

The following varieties are important in the export trade of the Province:—

Gravenstein, Blenheim, Ribston, King, Wagener, Cox Orange, Wellington, R. I. Greening, Baldwin, Stark, Northern Spy, Fallawater, Golden Russet, Nonpareil and Ben Davis.

Ten good commercial varieties for export are the following:—

Gravenstein, Blenheim, Ribston, King, Wagener, R. I. Greening, Baldwin, N. Spy, Golden Russet and Nonpareil.

Five good varieties for export might be as follows:—

Gravenstein, King, Baldwin, Spy and Golden Russet.

Several other combinations of five might be made up. They should be such as to have the periods of ripening distributed over as long a season as possible, and should include at least three winter varieties.

Some or all of the following varieties should be included in a list for home use in Western Nova Scotia:—Red Astrachan, Bough Sweet, Chenango Strawberry, Gravenstein, McIntosh. King, Biship Pippin, Wagener, Cox Orange, N. Spy, Golden Russet and Nonpareil.

The following varieties are recommended for planting in Eastern Nova Scotia including the Island of Cape Breton:—Crimson Beauty, Yellow Transparent, Astrachan, Duchess, Wealthy, Dudley, Alexander, McIntosh.

PROTECTION OF APPLE TREES FROM MICE AND RABBITS, AND CARE OF INJURED TREES.

W. T. Macoun, Dominion Horticulturist, Ottawa.

Every year thousands of trees are injured in Canada by mice, and, in the newer districts, a large number by rabbits also. There could be nothing more discouraging to a fruit grower, or would-be fruit grower, than to see his orchard which he has cared for, perhaps, for five or six years, ruined by mice; and yet this frequently happens. All this could be prevented if the farmer or fruit grower would use the information available and protect his trees from mice. Some years there is less injury than others, and this fact leads to carelessness, and when a bad year comes the trees are unprotected.

While the depredations from mice and rabbits in winter vary from one year to another, depending on the scarcity or abundance of food, the number of mice which are in the vicinity and the character of the winter, the injury is always greater when the orchard is in sod, and when there is rubbish lying about; hence the latter should be removed before the winter sets in. In most cases it is not necessary nor advisable to have the orchard in sod, particularly when the trees are young, although it is highly important to have a cover crop, which also may sometimes become a harbor for mice. As mice may be expected in greater or less numbers every winter, young trees should be regularly protected against their ravages. Mice usually begin working on the ground under the snow, and when they come to a tree they will begin to gnaw it if it is not protected. A small mound of soil from eight to twelve inches in height raised about the base of the tree will often prevent their injuring the tree, and even snow tramped about the trees has been quite effectual, but the cheapest and surest practice is to wrap the tree with ordinary building paper, the price of which is merely nominal. Tar paper is also effectual, but trees have been injured by using it, and it is well to guard against this when building paper will do as well. After the paper is wrapped around the tree and tied, a little earth should be put about the lower end to prevent the mice from beginning to work there, as, if they get a start, the paper will not stand in their way. It may be stated, however, that although two thousand young trees have been wrapped with building paper for several years at the Experimental Farm in Ottawa, there have been practically no instances where the mice have gnawed through the paper to get at the tree. The use of a wire protector, or one made of tin or galvanized iron, is economical in the end, as they are durable.

In the north, protection from sunscald is almost as important as protection from mice. At the Central Experimental Farm, wooden veneer protectors have been used for several years past for the standard trees, as these protect from mice and on account of being loose about the tree leave a good air space which appears to protect the tree from those sudden changes of temperature which seem to be the main cause of sunscald.

There are a number of washes and poisons recommended for the protection of fruit trees and the destruction of the mice and rabbits, but none of these are very satisfactory, as, if the mice or rabbits are numerous, the poison has not sufficient effect upon them to prevent injury altogether. The following method of poisoning has been found fairly successful.

Make a mixture of one part by weight of arsenic with three parts of corn meal. Nail two pieces of board each six feet long and six inches wide together so as to make a trough Invert this near the trees to be protected and place about a tablespoonful of the poison on a shingle and put it near the middle of the run, renewing the poison as often as is necessary.

The following formula, as a protection from rabbits, is recommended by the Department of Agriculture, Washington, D. C.: Unslaked lime, 20 pounds; flowers of sulphur, 15 pounds; water 50 gallons (40 Imperial gallons). This is applied to the trunks of trees with a brush.

Treatment of Injured Trees.

If a tree is badly girdled by mice it usually dies. If as soon as the wound is noticed it is cleaned and covered with grafting wax or some paste, such as sulphur, cowdung and clay, and wrapped with cloth to exclude air and prevent the wound from drying out, there is a possibility of saving the tree if the girdle is a small one, as the sap which rises through the wood will continue to do so, and returning through the inner bark in an elaborated condition will cause growth to be made all around the upper part of the wound, and if the latter be not too large there is a chance of its healing over. If, however, the wound becomes dry before the bandage is put on, the tree will almost certainly die, although it may continue to grow throughout the season. When the wax and bandage are applied the tree should be headed back considerably to lessen the amount of transpiration of moisture, as there will not be as much sap rise as if the tree were uninjured, and the wood will thus dry out sooner than if it were headed back. If the girdle is near the ground, in addition to covering the injured part with wax or cowdung and clay, it is advisable to mound up the soil about the tree to cover the wound and thus help to prevent the wood from drying out.

Girdled trees are frequently saved, and more surely saved than by the above method, by connecting the upper and lower edges of the girdle with scions, which are inserted about an inch apart all around the trunk. This is known as bridge grafting. The more scions that are used the quicker they will grow together and form a new trunk, but two or three scions successfully grafted on a small tree will carry enough sap to keep the tree alive. A slanting cut is made at each end of the wood in the uninjured wood in which the ends of the scions are to be inserted. Strong, plump scions of the previous season's growth—not necessarily from the same tree, nor even the same variety—cut a little longer than the distance between the slanting cuts, are made wedge-shaped at each end. They are made a little longer than the distance between the cuts in order that when inserting the ends into the cuts it will be necessary to bend them, and thus have them under pressure, which helps to keep them in position. After inserting, some of the inside bark of the stock should remain in contact with the inside bark of the scion, as it is here or at the cambium layer where union takes place. As soon as the scions are all placed the wound, especially about the ends of the scions where inserted in the stock, is covered with grafting wax. The ends are also at the same time bandaged with a piece of sacking around the trunk to aid in keeping the scions in place and to exclude the air. The tree should then be well headed back. The scions, if properly made and inserted, should soon unite with the stock and then carry the sap to the top of the tree.

Another method of bridging is to cut back the uninjured bark evenly all round the trunk and insert the wedge-shaped scions underneath the bark at the upper and lower ends of the wound. There are other methods also employed, such as using a scion bevelled at each end. Also, boring holes with an auger at each end in the uninjured bark and shaping the scion at each end so that it will fit into it.

One of the most satisfactory methods of utilizing the girdled tree is to cut it off close to the ground and insert a scion of some variety. This graft should grow at least three feet in height the first season and make a nice young tree.

A tree may sometimes be saved when the girdling is well above the graft by cutting the tree back so as to remove all of the injured part. Under such conditions young trees will usually start fresh growth and the strongest shoot may be selected to form a new trunk and top for the tree.

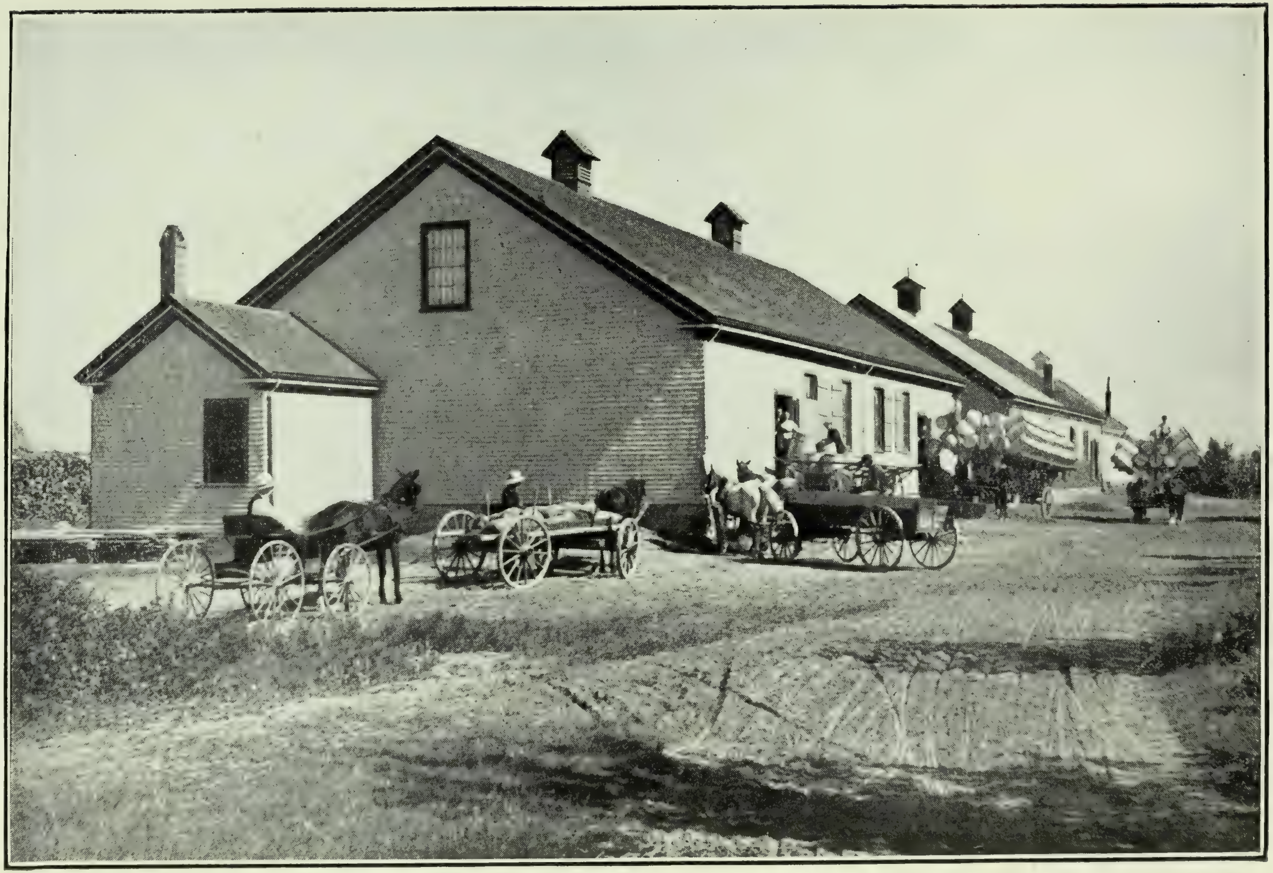
POINTS ON THE PACKING AND HANDLING OF APPLES.

G. H. Vroom, Dominion Fruit Inspector, Middleton, N. S.

In compliance with your request to write something touching the apple industry in the Province of Nova Scotia, I beg to submit the following:

Interior of Apple-packing Warehouse, Port Williams, N. S.

First, and very important in packing and marketing fruit is a good, well made package. The staves in a barrel should be so made that when the barrel is finished it will be eighteen and one half inches in the bilge, inside measurements. These staves should be thoroughly dried before



Scene at Apple Warehouses at Waterville, N. S.

using or making up into barrels. Spruce is the best wood for apple barrels, on account of it being light to handle, and more durable than other kinds of soft wood. Both ends of an apple barrel should be planed, and should be made of spruce wood, five eighths of an inch thick, and cut large enough to give a seventeen inch inside measurement to the head when the barrel is finished. Hoops may be either flat or half round. A split half round hoop made of birch or any other tough, hard wood will stand more handling than a flat one, but does not give the barrel so good a finish. I think it would be a great advantage if eight hoops were put on a barrel instead of six. All barrels used for packing apples should be thoroughly and properly nailed before the fruit is packed in them, except the bottom, which should be well nailed after the barrel has been closed up. Care should be taken that the nails enter the head, and not go under it, as is very often the case, and if the barrels get a fall, or the pressure is heavy on any particular barrel when in the sling, while being lowered into the ship's hold, the head comes out and the apples go down among the barrels and are wasted. Too much care cannot be used in nailing the barrel. The proper way is to use small nails and liners, the same as used in flour barrels. One other important thing is the stenciling. A few people still persist in marking their barrels with pencil, and in some cases incompletely at that, and the package looks badly, or to say the least, has an unfinished appearance.

The Inspection and Sale Act reads as follows: "Every person who, by himself or through the agency of another person, packs fruit in a closed package, intended for sale, should cause the package to be marked in a plain and indelible manner in letters not less than half an inch in length, before it is taken from the premises where it is packed, with the initials of his Christian names and his full surname or in the case of a firm or corporation, with the firm or corporate name and address, with the name of the variety or varieties and with a designation of the grade of fruit, which shall include one of the following four marks, viz: Fancy, No. 1, No. 2, No. 3, Such mark may be accompanied by any other designation of grade or brand, if that designation of grade or brand is not inconsistent with or marked more conspicuously than the one of said four marks which is used on the said package."

Every fruit grower should have a set of stencils, so that he will be in a position to properly mark his barrels, for by so doing he will add to the price in the market, and consequently to his bank account.

More care than is generally taken should be exercised in handling from orchard to store house. A great many growers fill their barrels in the orchard, and allow them to sit about on the ground without the heads in, and if rain happens to fall, the apples as well as the barrels, are soaked with water. And again, what is nearly as bad, is to head the barrels and lay them down on the side, scattered over the orchard on the cultivated land, and the rain spatters mud over them, and by the time the packages are stored they look anything but attractive, and bring less money on the market because they show unmistakable signs of carelessness and bad handling.

Another mistake that is being constantly made by growers and shippers is in putting too many barrels in one car. In many cases they are piled five tiers high, and if the car happens to be opened on the opposite side from which it was loaded at the fruit house, it is very difficult to get the top barrels out without injuring them, and after the barrels in the centre of the car have been removed very many of them get badly bumped while being taken down during the unloading process, notwithstanding the care taken by the men who handle them from car to ship. The barrels are rolled out on the shed floor, and are taken in slings and lowered into the ship, six at a time, and stowed five tiers high.

Speaking generally, I would say there is room for improvement in a great many ways in the handling of the apple crop in Nova Scotia from the time the fruit is full grown on the tree until it finds its way into the markets of the world, and this applies to local as well as export trade. In the first place, more care should be exercised in the picking, so that the fruit is not bruised by being thrown into the basket, and then dumped carelessly from the basket into the barrels. This also applies to the re-packing in the fruit houses. Apples should always be handled in such a manner that they will not be bruised. This can be done, and will be done when growers realize that when they are handling apples roughly they are simply throwing money away. When a barrel of nicely handled fruit, free from bruises, will sell for three dollars on a good market, a barrel of badly handled, bruised fruit will only sell for two dollars, even if the fruit in both barrels were taken from the same tree.

CO-OPERATION.

P. J. Shaw.

Great changes have taken place in the industrial methods of the world in the past fifty years. Machinery has to a large extent displaced the hand worker, the division of labor has been carried to a point never reached before, enormous sums of capital have been employed in productive operations and many industries that once consisted of scattered, independent, competing enterprises have been organized under the control of single managements. There has been a gradual change from small-scale production, carried on in many small establishments by small capitalists and hand workers to large-scale production in a few large establishments operated by capitalists having control of a large amount of wealth. The competitive system as it once existed in the industrial world has to a large extent passed away. The new system has come about as a natural growth and has resulted in greatly lessening the cost of production. Thorough organization, resulting in the destruction of competition, has enabled those controlling the industry in each case to reap nearly all of the advantage of this economy of production. In many instances, too, such organizations have been able to obtain control of important franchises or natural resources and still further increase their power to destroy competition and enlarge their profits.

The farmer in the meantime has remained an individualist and continued to do business in the old way. Whether he buys or sells or has his goods transported he meets and has to deal with those who are thoroughly organized. He must accept prices in almost all cases dictated to him by others. It is evident that as long as the farming class remains unorganized it will be the prey of the organized classes of society. The industrial laborers have long ago learned the advantage to them of organization in their dealings with employers. It remains for the farmers, the most conservative of all classes, to recognize the value to them of organization.

Co-operative Associations.

Co-operation has been defined as "the association of a number of individuals for their common benefit." A producers' co-operative marketing association is an organization operated for the mutual advantage of its members as producers. There are also consumers' co-operative associations organized and operated for the benefit of their members as consumers. Under right conditions co-operative associations, by effecting economies in buying and selling, or in the distribution of products as it is called, are capable of bringing much economic gain to their members.

"Briefly stated, among the economic advantages of co-operative marketing are the lower freight rate of the carload shipments as compared with smaller shipments; the command of transportation facilities by a strong association, perhaps at a time and a place when the individual shipper would be neglected and powerless; the prompt news service with regard to prices and market conditions in those trade centres where the association sells its products; the ability of the association to direct shipments in transit to the best market, uniformity in grading and packing products; and the establishment of a good reputation for quality. Again, the co-operative association, by means of having sufficient capital and an able manager, sells through trustworthy commission merchants and to dealers who may be depended upon to pay cash on delivery, or with whom short-time credit is safe." [Report No. 98. Systems of Marketing Farm Products. U. S. Dept. Agric., Washington, D. C.]

The need for co-operation and the benefits which would follow from such a system, properly carried out, are generally admitted. The difficulty is to make a co-operative scheme work out successfully in practice, or in other words to get farmers to co-operate. As a rule, farmers live more isolated lives and work more independently of each other than do those in other occupations. They are not so accustomed to associating with others in their work and in their business relations as are those living in towns and cities. They are less disposed to surrender to others their their right to handle their own products or to manage their business than are some other classes. Successful co-operation requires a fraternal spirit on the part of the co-operators, a willingness occasionally to make slight sacrifices for the general good and a faithfulness on the part of the members to the association and the management. A common weakness in co-operation wherever it has been tried has been the disposition of some members to desert their association and to sell their products through dealers when they thought it was to their advantage individually to do so.

A competent manager should always be employed and an adequate salary paid. Farmers are likely to underestimate the value of the services of such a man and to be unwilling to pay a salary sufficiently large to get and to hold the right man.

Relative to the amount of business done the capital required in co-operation is not large, since the products are not bought by the association but merely handled. There should be a sufficient amount of capital, however, or of credit or both so that the manager will not be hampered in his operations.

The movement in Nova Scotia for the co-operative marketing of apples began with the formation of the Berwick Fruit Company in 1907. Since then the movement has grown rapidly, between forty and fifty co-operative companies having been formed most of which are united in what is known as the United Fruit Companies of Nova Scotia, Limited. A special act has been passed by the Nova Scotia Legislature making the incorporation of co-operative companies a simple and inexpensive matter. The United Fruit Companies have met with many of the difficulties experienced by similar organizations elsewhere in their initial stages of development. But the difficulties are being gradually overcome and the prospect is that these companies will presently become an even more useful factor in the fruit industry than they have been in the past.

CO-OPERATION IN FRUIT MARKETING IN NOVA SCOTIA.

By S. C. Parker, Berwick, N. S.

The export of apples from the Annapolis Valley of Nova Scotia has grown from 35,000 barrels in 1893-1894 to 750,000 in 1909-1910. This is but a beginning of what is to come. Ten years will see the output doubled, and twenty years will mean an annual output of from two to three million barrels of apples from this section of country, less than one hundred miles long, and from five to ten miles wide.

Situated as this valley is, its extremity about one hundred miles from Halifax, an ocean port, with many steamship lines making it their winter terminus, and with good harbors for small steamers at Kingsport, Annapolis and Port Wade, right in the orchards, a system of shipping has grown up that is unique in the history of apple marketing. In the early years of the industry there were few, if any, buyers. The district was removed from the great centres of population, and the quantity of apples was so small that outside buyers did not come in to look after them. London was the principal market, and the early grower individually picked, packed, and usually consigned his output to that market. It was all very easy. A dozen English commission houses had resident agents making their headquarters here for the fruit season. These, in turn, had local agents at every shipping station, and the farmer handled his crop, be it large or small, in his barn or cellar, and hauled it in small lots to the shipping station, when the agent combined them in car load lots and forwarded to the consignee. The consignor heard no more of his goods for about four weeks, when he received his account sales, with a cheque for the net proceeds. This was a species of co-operation, but the profits were all on one side. The transportation companies took a generous slice. The general agent took all his conscience would allow, and divided the pot among his sub-agents. They, in turn, provided for their subs.

The greater fleas had lesser fleas upon their back to bite
'em.
The lesser fleas had smaller fleas, and so ad infinitum.

Then the consignee charged commission, insurance, brokerage, wharfage, lighterage, cartage, portage, and half a dozen other "ages," or lumped them all in a lot as "our charges." The growers fretted long under the burden, but individually were helpless.

Ten years ago the export reached 300,000 barrels, and a new system was inaugurated to meet the increased output. More storage room was needed, and the erection of frost-proof warehouses on the line of railway was begun. These were built, in some cases, by English commission houses, some by local dealers, and some by the growers combining. Here large quantities of apples were collected, packed, and shipped under a more uniform system. This, too, was a species of co-operation, but still did not put the profits in the right place. Once inaugurated, the warehouse systems grew with astonishing rapidity. The farmer, who a few years before was growing a few score or possibly a few hundred barrels, was now getting a thousand or thousands. He needed more frost-proof storage and expert help for packing. In 1910, every station on the Dominion Atlantic Railway, between Annapolis and Windsor, had from one to six of these buildings from 75 feet to 150 feet in length and with storage capacity of 5,000 to 15,000 barrels each. To these warehouses the fruit is brought as picked from the trees, and here gangs of skilled packers work by day and often, in the rush season, by night, turning out carloads of straight lots, uniformly and skilfully packed.

Another revolution, quite as remarkable, has come in the past decade. Before the warehouse system was established, and farm packing was the rule, individual consigning was also the rule. In 1900, probably seventy five per cent of the output was consigned by the growers, in small lots to the commission men. Now the universal tendency is to sell as picked, "tree run" as it is technically called, and in 1909, probably seventy five per cent of the crop was sold to buyers. Buying apples in the Annapolis Valley, however, is a precarious proposition. The men who can make money buying apples from the Nova Scotia growers, must be brighter than they are, and that class of men is scarce. The grower knows too much about the business. He is receiving daily quotations from foreign markets; he knows how to pack and market his own product, for he has been doing this for years. So, if he cannot get his price, he handles his own stuff. Only a few men of the many who have bought apples in the valley have amassed wealth. More have been financially ruined than have gotten out with a whole skin. Buying apples here is no get-rich-quick game. One Ontario man, who entered the field in 1909, is reported to have left $30,000.00 behind him when he pulled out.

Co-operation has been talked of for years. An attempt was made some years ago to organize the whole district on a comprehensive scale. This scheme, though good in theory, failed through being too large, and attended with too much initial expense. Three years ago, the first successful attempt was made at Berwick. Twelve men organized the Berwick Fruit Company, Limited, incorporated under the Nova Scotia Joint Stock Company Act. The idea expressed by the organizers was to commence on a small scale, put up a good pack, gain the confidence of the market, sell for cash, f. o. b. cars, or if sales were not quick, ship on consignment to good houses. The organization was a success from the beginning. The first year the concern handled 7,000 barrels, getting better prices than the average owner, and earning enough in commissions, etc., to practically pay working expenses. In 1908, some more good men were taken in and the output was about 1,5000 barrels. More members came in, and in 1909, 2,2000 barrels passed through the packers' hands, netting some $45,000.00.

The Berwick Fruit Company, in its first year's operation, consigned about one half of its output. A uniform and square deal have gained for their brand reputation that will sell thousand barrels lots by cable just as readily as by personal interview. This season, the output practically all sold f. o. b. cars, at the warehouse, and cash or draft attached to bill of lading are the usual terms. The company sells over a wide range. Three cars of Gravensteins were sold in the Canadian West, going as far as Moose Jaw. Five cars to South Africa buyers at $4.50 per barrel, was a satisfactory deal for both buyer and seller. A feature of the business is that both of these extremes want more of the same stuff. Inspired by the success of the pioneer company, others are being formed. A general co-operative act of the Nova Scotia Legislature makes the process of organizing easy and inexpensive. Five co-operative companies operated last year, handling about one tenth of the crop. This year ten are at work, all owning their own packing houses and controlling, probably, twenty five per cent of this year's crop. As a means of getting nearer together a central organization has been formed, composed of representatives of the tributary companies. This central organization has a board of directors and general manager, and we look forward to a not distant day, when the central company will sell and buy for all the subsidiaries. The central company in 1909 chartered three steamers, and shipped 2,5000 barrels to London in their own ships, saving fifteen cents per barrel, freight to shippers, and incidentally making $1500.00 clear money, which is laid aside for a rainy day, which is liable to come sometime.

The day of small things in the apple business is past, and the prospect now is, that in a few years co-operative associations will practically control the output of millions of barrels from the famed Annapolis Valley.

CRANBERRY CULTURE.

J. S. Bishop, Auburn, N. S.

The growing of cranberries in Nova Scotia may be said to have passed the experimental stage and now classes as one of the industries of this Province. The area devoted to the culture of this fruit is yet comparatively small. During the last score of years a number of small bogs have been planted in different sections of the Province. These are chiefly situated near the middle of the Annapolis Valley, a few in Lunenburg and Shelburne Counties, some in Cape Breton,as well as other places where favorable conditions have been found, in all, perhaps three hundred acres. When some bogs have been cared for, and their requirements attended to, the result has been, to a large degree, satisfactory. In a good season the total yield is as high as seven thousand barrels. The Dominion of Canada annually consumes some twenty thousand barrels of cranberries, the greater part of which, to meet the demand, is imported from Cape Cod. There is no reason why Canada should not largely supply her own market with this fruit. Much of the natural bog found in Kings and Annapolis Counties, as well as in other parts of the Province, could be turned to profitable account for growing cranberries. This is an industry that furnishes a helpful auxilliary to any phase of farming or fruit growing, as it is in no way dependent on the resources of the ordinary farm, and the demand of its culture largely met with at times that might be termed not the most hurried in the year. Successful cranberry culture depends upon:—soil, drainage, an abundant supply of sand, and water privileges.

Soil.

Almost any soil designated as peat-bog, swamp, or muck' can be made suitable for cranberry growing, providing it can be drained so that the roots of the vines will not be standing in water during the growing season. The water level should not be more than one foot from the surface of the ground. It does not matter whether the mud is a few inches, or several feet deep. In either case, it requires to be covered with several inches of sand before planting to vines. Moist flat land, when the sand can be brought to the surface with the plow, makes a good cranberry bog. Again, a shallow lake or pond, by draining, can be made a suitable site for growing berries. Usually a bog of this kind can be made at much less expense than when the land has to be cleared of turf and sanded.

Drainage.

Unless your site for making a bog can be suitably and quickly drained, it will never be a success in the way of fruit. It is decidedly an advantage to have the land drop very rapidly at the outlet of your main ditch. A bog usually is constructed with a main ditch or waterway through the middle of it, and if the bog is of considerable width, cross ditches at regular distances. If the bog is springy where the edges meet the upland, it will be necessary to cut a marginal ditch to cut off the soakage; otherwise the bog will be too cold and damp for the vines to mature their crop. Bogs of large area require much more care in the construction of their drainage system, than narrow bogs along the course of a stream.

Sand.

One of the most important requisites in successful cranberry culture is a good supply of sand, both in the making of the bog and the keeping of it in repair. Coarse sharp grit is best. Some growers prefer fine gravel. Fine sand will often do when coarse cannot be obtained, although it favors the growth of moss, and does not seem to hold the heat of the sun to ward off frost in the early fall when the berries are maturing, as coarse grit will do. If the bank around the bog consists of suitable sand the condition is ideal in this respect. Re-sanding has to be carried on at regular intervals in order to keep the bog in a bearing condition, and to resist the action of frost on the crop. A near by supply entails much less expense.

Water Supply.

One of the most telling features in connection with a cranberry bog is an available water supply, in which case the grower is practically safeguarded against either spring or fall frosts, as well as the ravages of insect pests. While it is possible to grow cranberries without means of flooding, and most of our bogs in Nova Scotia are that kind, it is a distinct advantage to be able to flood and re-flood at will. There is no reason why such a bog should not give a crop of berries every year. Re-flooding can sometimes be accomplished by a pumping outfit, when the water does not have to be lifted more than ten or twelve feet. When it can be done, flooding by gravitation is the ideal way and by far the cheaper method. A bog with a stream running through it can often have a dam and reservoir near its source from which the water, when needed, can be brought on by gravity.

It is a great advantage to be able to re-flood a bog for forty eight hours about three weeks after the winter water has been drawn off, as it destroys fireworm as well as other injurious insect pests that are not so much in evidence. A partial flooding will protect a bog from June frosts, but in no case should a bog be flooded during the blossoming period as even a short submerging will blast the bloom. It is a general practice to re-flood a bog for a day or two after the crop is picked, as the water helps the vines to recover from the shock of scooping. The time for winter flooding is usually about the first of December.

Preparation of Ground.

If the site chosen is natural bog the turf can first be removed by cutting into squares with a broad bitted axe, and hauling off with wheel-barrows; or in case the mud is shallow by ordinary team wagons. In the absence of timber or heavy bush growth, the mossy turf can be cut and turned upside down without removing. In this case in order to prevent the turf vegetation from sprouting a greater body of sand is needed. In some cases, when the turf has been heavily fired and burned down to the mud, the sand can be brought on after levelling up a little, although the ash should be removed as it favors the growth of fire-moss. In shallow bogs, the sand can often be brought up with the plow and is at once ready for planting vines. Sand serves a double purpose and is essential to successful culture. It not only gives the roots a better medium to grow in than peat but affords better drainage and aeration, besides absorbing more heat from the sun during the day and giving it off at night, thus warding off early frosts. The root growth is regulated by putting on more or less sand, and the vine growth kept fresh and healthy in this way. After two or three inches of sand has been brought on and spread evenly over the mud, the bog is ready for setting.

Planting the Vines.

After spreading the sand evenly over the surface, the bog should be laid off, with a marker, into rows from twelve to eighteen inches apart. In Nova Scotia the running vines are trailed along these rows two vines side by side and looped into the ground with a wooden spade or dibble. One end of the vine can be held in place with the feet of the operator while he presses them firmly into the soft sand. The popular Cape Cod method is to run the marker both length and cross ways, pressing a tuft of vines into the ground at the intersection of the line. Either method will give much the same result, the ground having to be well matted over with vines before they grow much fruit. It is no advantage to bunch the vines in hills as only about two or three will grow and matting over be no faster than if fewer vines were used. The laterals can be pressed into the sand and the uprights left out for an inch or two. If the water can be brought on and the bog flooded to the top of the ground for a day after the vines are set, the plants will start growth at once. The last two weeks in May and the first week in June is considered about the best time for planting, although a later planting than this will sometimes give very good results.

Care of the New Bog.

During the first summer water should be kept in the bottom of the ditches, but no re-flooding is necessary during the growing season. All weeds and shrubs that appear should be carefully removed. The object is to get the bog vined over as quickly as possible. If the bog is thoroughly weeded for the first three years, until it is well vined over it will take less weeding after that to keep it in good repair. It is also beneficial, at the end of the second season, to give the bog a light coat of sand, to fasten down the runners and stimulate the vine growth.

Fertilizing.

If the cranberry bog is made on deep mud bottom usually no fertilizer is required, especially if the vine growth is vigorous. But on bogs where the mud is thin, or on clean sand bottoms where vine growth is thin a light application of nitrate of soda gives very satisfactory results, both in regard to vine growing, and also increasing the size of the berries. It also tends to force the crop along and bring it to maturity quicker, and thus to be in better shape to resist early fall frosts. The amount required is comparatively small, only from one hundred to one hundred and fifty pounds to the acre. It should be thoroughly mixed with twelve times its bulk of sand for even distribution. It should be sowed by hand, when the vines are dry about the middle of June. Its use has another effect of no small importance in checking the growth of fire-moss. A more liberal application will kill this outright.

Care of Bearing Bog.

A cranberry bog, if well cared for, usually commences to bear the third year after planting. The fourth and fifth year should see it well vined over and a full crop may be expected. After the picking season is past, the bog should be looked over and all weeds, gasss, or shrubs that may be found there removed. If a bog has a tendency to produce bunch grass or rushes the best time to remove them is in the fall, just after the ground freezes and before flooding for winter; these bunches or tussocks can be cut off, even or close to the surface of the ground, with a common adze or axe. A sharp spade will do. If thus treated at this particular time the roots will die and give no further trouble. Perhaps the most important requirement of a bearing bog is re-sanding. This should be done as often as every other year. Some of the most successful growers sand every year. This can be done directly after harvesting in the fall, in winter on the ice, or early spring before the vines start growth. In Cape Cod sand is almost always brought on in wheelbarrows over lines of plank, an abundant supply of sand being found around the bogs. But in Nova Scotia sand is not always so plentiful and sometimes has to be hauled quite a distance on wagons. In order to get it on the bog a roadway may be made of boards or light plank, seven feet wide, made in sections from five to six feet, and placed one after another extending across the bog. This will support both team and load of sand, and spreading can be carried on for a width of seven feet on either side. After these strips have been carried across the bog, the roadway can be quickly shifted over by a couple of men, and another two strips done in the same way. After the sanding is completed these sections may be stacked up or piled one on top of another to a convenient height, the top one having one end raised to carry off the rain, and thus preserved for use year after year. This re-sanding prevents the bog from getting soil bound, and keeps a continuous growth of new wood for bearing. Sand also furnishes the best possible insurance against frost; a properly sanded bog rarely loses its crop from this cause. Successful and profitable fruitage depends largely upon the amount of care and attention that you give the vines.

Pruning.

If the vines become too thick and woody they may be thinned with knife rakes. It is sometimes an advantage to use the rake lightly to remove loose vines after scooping the crop. Always use the rake in the same direction as the scoops are to be used in picking. There is generally more difficulty in getting enough vines, particularly on the hard bottom bog in Nova Scotia, than an excessive vine growth.

Varieties.

There are a number of varieties of cranberries where ever grown, differing in size, color, time of ripening, habits of growth, and productiveness. At Cape Cod the two best varieties konwn to the trade, and grown everywhere in that district, are the Early Blacks and Late Howes. These may be considered standard varieties. A variety called Perry Red is becoming popular, also an exceedingly prolific sort called Vose's Pride. This kind, however, is pear-shaped and does not clean up as readily as cherry or olive-shaped stock. There are also a number of fancy kinds some of which are of large size; but as a rule they are poor keepers, having large seed cavities so do not stand up and are not satisfactory for shipping. In Nova Scotia a number of native varieties have been tried some of which have turned out well and compare favorably with the best stock anywhere produced.

A berry found on a small bog on the old Van Buskirk property at Auburn is extensively grown in that vicinity, and ranks there as a standard. This berry varies in appearance from bell to olive shape, is good size, fine color, ripens early, is hardy, exceedingly prolific, and about all that can be desired in flavor. It keeps as well or better than any other stock grown there. It has been pronounced by Cape Cod experts to be first class. As a rule, kinds that are late in coloring are to be avoided. This kind takes on color well, after it is picked and stored. This variety is a very popular one with the writer of this article.

Insect Pests.

There are many enemies to cranberry growing in the shape of insects, some of which eat the berries during the growing season, others work upon the vines. The one with which every cranberry grower is familiar is the fruit worm. This insect causes serious loss to the crop; some seasons nearly half the crop is destroyed by its ravages. It eats its way into the berry from the outside, causing it to turn red and fall off before the proper time for maturing. After destroying one berry it will attack another in the same way sometimes causing considerable damage after the crop is picked. The best means of controlling this insect, so far known, is to hold the winter flooding until about the first of June. This practice is not to be recommended every season as it affects the vine growth.

In the early stages of cranberry growing the fire-worm seriously threatened this industry. It is easily controlled when a bog can be re-flooded for a few hours about three weeks after the winter water is drawn off. When flooding is not practical, the vines can be sprayed with arsenate of lead about the first of June. Under favorable conditions almost any insect found on bogs may develop into a pest for one or more seasons. The common span worm has been known to completely strip the vines of leaves during the summer and early fall. There is also an insect called the girdler that works in circles on the bog in late summer, usually in thick matted vines. Flooding for forty eight hours, directly after harvesting the crop, kills this worm. Keeping the vines well sanded has a tendency to keep all these pests controlled. There is also a very minute insect called the tip worm, which works on the bud or tip of the vine, destroying the fruit prospect for the next season. Re-sanding every season is recommended for this trouble.

Fungous Diseases.

There are fungous diseases that affect cranberry culture to a greater or less degree, some of which affect the vine, others cause decay of berries on the vine, and also affect the keeping of the berries after they are picked and stored.

Experiments are being conducted at the present time in the Cape Cod region in regard to the control of these diseases, and it is to be hoped that more extensive knowledge along this line will result in better methods of dealing with this trouble. Spraying with Bordeaux mixture has already given some satisfactory results, and the keeping qualities of the fruit improved by this treatment. On the other hand the use of Bordeaux seems to affect, somewhat injuriously, the root system of the vine. It has been found that several applications of Bordeaux will kill fire moss.

Harvesting.

The time for harvesting cranberries in Nova Scotia usually begins about the middle of September, when the berries are sufficiently colored to cure up after they are stored. If picked too green, they shrivel up and are always of pale color, besides being of much smaller size. Every week that they can stay on the vines after the above date, adds much to their appearance both in size and color. Were it not for early frosts picking would not commence until two weeks later. Cranberries should never be picked when the vines are wet, and operations should not be started in the morning until after the dew is thoroughly dried off.

In the early years of cranberry growing all the berries were picked by hand, and even yet where vine growth is thin and on newly planted bog, it is far less injurious to the vines to hand pick the crop. At the present time, however, most of the berries are gathered with scoops more quickly and at far less cost than in the old way. When hand picking can be done for one cent per quart, the method is all right. But when the cost doubles, it cuts down the profit of producing.

Scoops, usually operated by men, are made of different widths, varying from fifteen to twenty two inches, with teeth about ten inches long made of wood or hollow metal They are inserted into the vines just above the laterals and by an upward motion the berries are pulled off and fall into the back of the scoop. After several repetitions in this way the berries are emptied into shallow boxes or baskets, holding about a bushel. An operator will gather, in this way, from six to ten barrels or more in a day, according to the crop and the condition of the vines. Ordinarily the crop can be gathered at a cost of from forty to sixty cents per barrel. When the crop is very heavy the cost of scooping sometimes falls as low as ten cents per barrel. The cranberry grower should have a sufficient number of bushel boxes to store his entire crop. A cheap, but not very strong box, can be made of ordinary lath cut in the middle and nailed to solid ends three quarters of an inch thick. These ends are thirteen inches long and eight inches wide. A slight space between the laths admits of air circulation. A small cleat across the ends makes a safer package for handling and carrying. A stronger and better box can be made of wider material, sawed for this purpose and made up in much the same style. The berries should remain in these boxes with whatever leaves and vines that have been gathered in scooping, until they are ready to be milled out and transferred to barrels for shipping. The old custom of taking the barrels to the bog, and filling and heading at once, should never be practised. If put in barrels as they are picked the temperature rises within a few hours, and fungous disease starts immediately which results in the early decay of the berries. Absence of care at this particular time, and want of more thorough knowledge in regard to proper conditions for handling and fitting the fruit for market, have done much to give the impression that Nova Scotia berries do not stand up or keep as well as those grown at Cape Cod.

After picking, the berries should be taken at once to a cool, dry packing house where an even temperature can be maintained. The packing house should be closed tightly in damp rainy weather, and opened up and thoroughly ventilated when the weather is dry. Constant care should be exercised, from the time the berries are picked, to injure them as little in the process of handling as possible, as decay is undoubtedly hastened by injury received by the fruit in the process of handling and cleaning.

Preparing the Berries for Shipment.

Early shipments usually go forward soon after the fruit is picked. The demand at this season is more or less limited. The bulk of the crop is not needed until cooler weather.

It is better not to clean up berries until the market is ready for them. It is the policy of some growers to clean up and sell as soon after picking as possible, accepting the lower price and save shrinkage and deterioration of fruit. In this case the cost of cleaning up is less than if kept until winter when the price rules higher. The berries are first milled out through a machine called a separator of which there are a number of makes. They all have a hopper at the top into which the berries are turned from the boxes in which they are picked. A fan in the machine blows out leaves, vines, and all light dirt; then, by a system of bounding boards the fruit is freed from soft and decaying berries, the sound stock going into a box or barrel. Some machines are provided with a grading device which takes out the very small berries. If the berries are somewhat wormy, they will need to be poured into a screen and run over by hand to remove wormy and imperfect specimens. Women are usually employed for this part of the work and paid by the hour. It is usually more satisfactory to screen them all as they come from the separator before barreling. As yet Canada has no standard dimension barrel. The Cape Cod standard barrel calls for

Length of staves	28½	inches
Diameter of head	16½	"
Distance between heads	25½	"
Outside circumference of bilge	58½	"
Thickness of stave	2-5	"

As our berries all over the markets of Canada come in direct competition with Cape Cod product, it is a reasonable decision to adopt their standard size of barrel, which holds between eighty-five and ninety quarts and weighs approximately one hundred and twenty pounds.

The barrel should be filled and thoroughly raked down and the head pressed in snugly with a lever. Loosely packed barrels are avoided by the trade as the moving about of the fruit in the barrel results in loss and decay.

Prices and Markets.

The wholesale price of cranberries in Canada is usually around five dollars per barrel, only on rare occasions has it gone lower. There is an increasing demand for the fruit.

There is suitable land enough within the Dominion, if planted to cramberries, to supply a large part of this trade. It has been demonstrated beyond doubt that we can grow these berries profitably at the ruling price. All we need is to have our attention called to this fact and to go about it and develop this industry.. The money that is being paid out for this product could largely be kept within our own border, and our country be the better for utilizing some of its now waste land.

STRAWBERRY CULTURE.

L. D. Robinson, Berwick, N. S.

Introduction.

Without doubt, the strawberry is the most popular fruit produced in Canada—the most popular because it is the best No other delicacy can compare with it, except strawberries and cream. Henry Ward Beecher but voices public sentiment when he says: "Doubtless had God tried to do so, He could have made a better berry than the strawberry, but it is equally certain that He never did." The strawberry is the gardener's pride, the epicure's delight and a joy to all.

It is the first fruit to ripen and thus it is welcomed by us as a pledge of the good things to follow. Not only is the strawberry the best fruit of all but it is within the reach of all. Nothing planted in the garden gives surer return for labor. A small patch of strawberries well cared for will supply the wants of a family with a luxury unsurpassed.

History.

Of all the fruits, the strawberry has the widest range. In its wild state it is found widely scattered over the temperate zone. In Canada, its domain stretches from the 60th. degree in the north to the boundary on the south; and from the Atlantic on the east to the Pacific on the west and where the wild varieties abound, the cultivated are sure to flourish.

The evolution of the cultivated varieties is somewhat modern in comparison with most of our cultivated fruits. Though under cultivation in gardens for centuries, little improvement had taken place in the strawberry previous to the 19th century. It was still little better than the wild varieties.

In the early part of the 19th century, however, a marked advance was made by mating the Chilian, a wild species inhabitating the west coast of America, with another wild species inhabitating the east coast. The result was Keen's Seedling, exhibited in London in 1821, as the finest berry of the age. Keen's Seedling became the ancestor of most of the English varieties.

But the English varieties did not take kindly to American soil, and attempts were made, on this side, to originate a variety better suited to our soil and climate. In 1843 the Hovey appeared. This berry was a wonderful improvement on all varieties hitherto known in America, and it held first place until outclassed by the Wilson in 1857.

This wonderful berry held its place as the best commercial variety for more than a quarter of a century. Finally, however, it, too, was forced to give way to still more wonderful creations. Today there are hundreds of varieties that far excel the Wilson in size, quality and productiveness.

During the past one hundred years the strawberry has increased in size, from that of a cherry to the size of a plum; and improved greatly in quality and productiveness. We are still, however, looking for the ideal strawberry.

Soil.

The strawberry is not fastidious as regards soil, providing it is well drained, and not likely to bake. It usually succeeds well on any soil suitable for growing potatoes. Its natural place in a rotation is after a hoed crop.

No single factor in strawberry growing is so important as the maintenance of an abundant supply of moisture, especially during the fruiting season. It is important, that the soil for strawberries should be naturally moist; still more important that it should contain an abundant supply of humus, for it is upon that reservoir of moisture that the strawberry must depend in times of severe drought.

Fertilizers.

The soil for strawberries should be made much richer than for most farm crops. Not that the strawberry removes larger quantities of plant food from the soil than these—quite the reverse. A ton of timothy hay, for example, removes fully five times as much plant food from the soil as a ton of strawberries. Yet the soil must be made very much richer for growing strawberries than for timothy hay. This is doubtless accounted for by differences in habits of their growth as well as by the very heavy demands made upon the strawberry plant, in the latter part of the fruiting season.

The value of humus in conserving soil moisture has already been pointed out; but humus does more; it warms, sweetens and mellows the soil. By its decomposition, nitrogen, phosphoric acid and potash are set free, and last, but not least, it is a liberator of the dormant plant food in the soil.

Stable manure owes its great superiority as a fertilizer, not so much to the plant food it contains, as to its rich supply of humus making material. No single fertilizer surpasses stable manure in strawberry growing. When used alone, 30 to even 40 tons to the acre may be used to advantage. When the soil already contains sufficient humus, 15 tons of stable manure supplemented by 500 lbs. of bone, 500 lbs. acid phosphate and 300 lbs. muriate of potash should give equally good results. When the ground contains very large supplies of humus from previous heavy applications of stable manure or plowing in cover crops, excellent crops can be had from the use of 1000 lbs. bone, 1000 lbs. acid phosphate and 400 lbs. muriate of potash to the acre.

Preparation of the Soil.

The strawberry crop is one of the most expensive that the farmer can raise. It requires heavy applications of fertilizer, costly plants and extensive cultivation. Thus the preparation of the seed bed, always important, becomes doubly so in strawberry culture. Deep plowing, late in the fall, is recommended partly because it improves the tilth of the soil and frees dormant plant food and partly because it exposes white grubs and wireworms to the frost.

The plot shall be plowed again in the spring, as soon as the soil is fit and thoroughly pulverized to a depth of several inches. It should now be levelled with a heavy plant drag, which is much better for this purpose than the roller; for the drag crushes lumps while the roller sinks them.

Plants.

It usually pays the grower to produce his own plants; for home grown plants as a rule are cheaper, fresher and truer to name than when bought. The best plants are those taken from the new bed nearest to the parent plant: the worst, those taken from the old bed. It is best, on the whole to dig up the entire row and then sort out the weaker plants. Cutting the roots back to about two-thirds their length will facilitate planting and lessen transpiration of moisture

When plants come from a distance, they should be immediately unpacked and moistened; and in case the ground is not ready to receive them, heeled in and the soil pressed firmly about their roots.

Pollination.

Occasionally, complaint is made that, "my bed produces nothing but nubbins." Sometimes this condition is brought about by late frosts or too much rain during the season of pollination. But lack of stamens to produce sufficient pollen is usually the explanation.

There is sex in the vegetable as well as the animal kingdom. The male organs of flowers are called stamens, and the female organs pistils. The pistil is adhesive and receives grains of pollen or flower from from the stamens through the agency of the wind or insects and thus the ovary is vitalized, and the fruit begins to develop.

When blossoms contain both stamens and pistils, they are termed bisexual, staminate or more commonly, perfect. When blossoms contain pistils, but lack good stamens, they are said to be pistillate or imperfect.

It is very important, when planting an imperfect variety of strawberries, that every third or fourth row should be of some perfect variety corresponding in season with the former. It is often better to use a mixture of fertilizing varieties rather than a single variety.

Planting.

The writer has found the following method of planting rapid and in every way satisfactory. Rows are carefully staked off, three feet apart, and a cod line stretched tightly between the end stakes close to the ground. A man with an ordinary round pointed shovel follows this line, making holes 15 to 24 inches apart, according to the tendency of the variety to produce runners. In making the holes he drives his spade down to a depth of about five inches and in the act of withdrawing it pulls it towards himself so as to deposit a wedge of earth as near the hole as possible.

A boy with a basket of prepared plants follows, dropping a plant close to the vertical side of each hole. The setter deftly grasps the plant between the thumb and fingers of the left hand, places it against the vertical side of the hole with the terminal bud just above the surface of the ground; and then with his right hand forces the wedge of earth into its place. A quick motion in transferring the plant to the hole, will usually suffice so far as spreading the roots is concerned.

Cultivation.

If the object in the preparation of the seed bed is to render the soil congenial to plant life, then the aim of all subsequent cultivation should be to maintain those conditions. In strawberry growing, cultivation should begin as soon as planting has been finished. At first, the cultivator should be run somewhat deeply so as to re-mellow the soil trodden down by planting. Later, cultivations should be shallow; the main object being the destruction of germinating weeds, and the maintainance of a dust mulch. Experience has shown that this result is best obtained by running the cultivator lightly at intervals of ten days and after each rain.

When the rows are evenly spaced very little hand work will be necessary until the runners need attention. These should be trained into the rows and a little earth placed on them to hold them in place, until a row has been formed eighteen inches wide, with plants four inches apart All later runners should be destroyed. It is difficult to keep matted rows free from weeds, but it must be done. A bumper of berries was never taken from a weedy patch.

Spraying.

Leaf blight or rust is yearly becoming more troublesome, especially on light sandy soils. Much of the damage usually attributed to drought is caused by this disease. For, like drought, strawberry blight causes the leaves to wither and the berries either to ripen small or dry up. The first indications of this disease is the appearance of circular, reddish spots on the leaves early in the season. As the disease develops, the spots grow larger and finally a new crop of spores is produced that in turn attack the leaves.

Bordeaux mixture has proved very effective in controlling this disease. It must be borne in mind that this remedy is preventive, not curative. It should be applied thoroughly in the spring, just as the new leaves start and again when most of the blossoms have fallen. The strength recommended is 4-4-40. Young plants, too, are often greatly benefited by two or more applications of Bordeaux during the growing season.

Mulching.

Complete success in strawberry growing cannot be attained in Nova Scotia unless the patch is well mulched. Mulch is necessary both as a winter protection from freezing and thawing and also as a summer protection from drought.

The best materials for this purpose are rushes, straw and coarse hay in the order named. The mulch should be applied at the rate of not less than three tons to the acre, as soon as the ground is frozen sufficiently to bear a team. Great loss frequently results from neglect of this caution.

In the spring, when the plants show signs of growth, part of this covering should be raked between the rows. A slight covering that the plants can push their way through is of great benefit in times of drought.

Varieties.

In the choice of varieties, the soil, the climate and the market must be considered. Varieties that under certain conditions have proved profitable may under changed conditions prove worthless. The beginner should be guided in his choice more by the advice of growers in his vicinity than by catalogues. If his land is early, he may find it profitable to plant some of the early varieties, Warfield, Beder Wood, Senator Dunlap. On the other hand if his land is late, he may find it more profitable to plant some of the later varieties, Sample, William Belt, Commonwealth or Brandywine.

The writer has found the Senator Dunlap a very profitable berry. It is among the earliest and best. It is vigorous and a great yielder. It produces large berries and does not blight badly. It has perfect blossoms.

Profits.

In estimating the profits from growing an acre of strawberries, as given below, it has been assumed that at least half of the value of the manure used will be available for future crops. No credit is given for the undoubted value of the mulch and vines as humus making materials for succeeding crops. Four thousand quarts to the acre is considered a fair average crop in the preceding article. Ten cents per quart is the average net returns received by the writer for the past two years.

	Dr.	Cr.
To Rent of land for two years	$ 14.00	
Value of fertilizer used	30.00	
Hauling and spreading 30 tons stable manure	15.00	
Plowing, harrowing and levelling	8.00	
Plants	30.00	
Planting	10.00	
Cultivating and weeding 12 times	30.00	
Mulching	20.00	
Crates	19.00	
Boxes	14.00	
Picking and hauling to station	60.00	
Balance, (profit)	150.00	
By 4000 boxes at 10c		$400.00
	$400.00	$400.00

STRAWBERRY GROWING IN THE ANNAPOLIS VALLEY.

Manning K. Ells, Port Williams, N. S.

In the Annapolis Valley the cultivation of potatoes is becoming less and less profitable each year. Farmers are turning their attention to other ways of making a living. Of course, orcharding is first, but nearly everyone feels that it is not wise to put all his eggs into one basket, no matter how closely he watches the basket. Among other crops none are more profitable than the strawberry. Prices are as high as in the far-famed West, and just as large yields may be secured.

I prefer a loam to a light loam, as free from weeds as possible, especially couch grass. Manure either the fall before, or spring you plant, with barnyard manure, about sixteen large two horse loads to the acre. I usually supplement this with a dressing of commercial fertilizer, sown broadcast, and harrowed in lightly, just before the young plants are set. I use five hundred pounds of acid phosphate, two hundred pounds of muriate of potash and one hundred pounds of nitrate of soda to the acre. I mix this on the barn floor before sowing, and think I get the fertilizer more evenly distributed in this way.

Now as to varieties, there is only one for me, the "Senator Dunlap." It makes the best row, is the earliest berry and gives a better crop right through the season, than any other berry I have fruited. Of course, many will differ from me in this, and I have only tested about twenty-five varieties, but in this article I am writing only of my own experience. If the manure is applied in the fall, a thorough harrowing with the disc and spring-tooth will fit the land all right for the young plants. Put a roller or planker over the piece just before setting to firm the earth. The usual distance is three and a half feet apart for the row, plants eighteen inches in the row. Mark the land with a marker made of three or four boards set in a frame, like sled runners, forty-two inches apart. Draw the first row to a line, and all the rest will be right. It pays to be particular in this, for with rows exactly the same distance apart, the cultivator can be spread to almost touch each plant, and the hand work will be much reduced.

I set the plants with a steel dibble, about ten inches long and four wide. See that the earth is pressed very firmly around the roots of each plant, and right here is where your strawberry field may be a failure. Test every man's work from five to ten times a day, if necessary, to see if he is doing this part of the job properly. I lose more plants by loose setting than from all other causes. Start the cultivator as soon as the planting is done, to stir up the ground, and harrow out the footprints of the workers. I have been told that every footprint evaporates one quart of water each day, so we see how important it is to keep a dust mulch over everything. Hand hoe after each rain, and about every ten days, until the runners prevent any further hoeing. Turn the first runners along the row, and as they become more numerous, narrow up the cultivator.

When the ground is frozen hard in December, put a mulch of straw, swamp rushes, or marsh hay over the rows. The mulch need only be heavy enough to shade the rows. This is not disturbed in the spring. The plants come right up through it, and the straw lies close to the ground, and seems to retard evaporation better than if lifted to let the air under it.

The picking problem must be solved individually by each grower. If there are others in the business in your neighborhood, and help is scarce, your acreage must be limited to what you can pick, for the strawberry will not wait, and one picking left too long means bad berries mixed with the good ones all through the rest of the season. My berries cost one hundred and fifty dollars an acre, counting boxes and picking. Gross returns, from three hundred to four hundred dollars an acre. Many growers are getting much more than this, but I think an average in a commercial way is about what I have stated. No fruit pays for extra trouble and tillage like strawberries, and in growing them in their excellence, pleasure and profit are combined, I think, to a greater extent than in the growing of any other farm products.

RASPBERRY CULTURE.

By R. H. Lee, Berwick, N. S.

I have grown and shipped raspberries for about twelve years, and have always considered this crop satisfactory. One year my yield was in the vicinity of 3,000 quarts, from an acre and a half. These would net me about 10 cents per quart. I never made any estimate of the cost of production, as the berry business was a side line, and much mixed up with other work. About 3 cents a quart would pay for the cost of picking and marketing. I have never fertilized heavily, and when the canes came into full bearing I tried to give them commercial fertilizer one year and stable manure the next. A raspberry patch is good for eight or ten years, possibly longer, and constant cultivation takes out the humus, hence the necessity for stable manure.

Planting.

In preparing the ground for planting I would like to have it in as good condition as for grain or potatoes. But this is not always necessary. I would with my present experience place the rows far enough apart to allow a one-horse harrow to go through, and plant as close in the rows as I could. The closeness of planting would largely be decided by the cost of the plants. The more plants set the sooner you get a full crop. Furrow out the land with a plow, and drop the plants as you would potatoes. Then a man can go along the row and catch a plant by the top, pull the earth in with his feet around the roots, and tramp it hard, and so on to the end of the row. Afterwards the cultivator may be put through, and when hoeing, the furrow between the plants can easily be filled in, or a light furrow may be run on each side of the plant row, and dressed off with the hoe. This is the quickest way to set them.

When the hoeing time comes, which should be quite often, in dry weather, a very small handful of nitrate of soda worked into the soil around each plant, about twice in the season, will be sufficient for the first year. I like to plant them before the growth starts in the spring, but have no doubt that fall planting would be equally satisfactory. If the land is in good condition, and the plants are far enough apart in the row, some crop like potatoes or beans may be grown in the row. If the rows are five or six feet apart a row of such vegetables may be grown between the raspberry rows. I do not think it advisable to plant them in a young orchard unless the ground is moist and well fertilized.

Age of Coming Into Bearing.

The second year you will get a few berries, and about the third year owing to the growth and increase in the number of canes, a full crop may be expected.

Cultivation and Fertilizing.

The weeds and grass should never be allowed to get a hold at all. The rows should be kept level, and between the rows cultivated lightly, but thoroughly, as the feeding roots are quite near the surface. Bone meal and stable manure are good fertilizers, and about 300 pounds of nitrate of soda applied when the berries are nicely set will give them a great lift. Any fertilizers which are good for orchards are good for raspberries, but I consider the nitrate of soda very important.

Pruning.

The only pruning required is to cut back the tips of the longer canes, and to remove every year the dead canes, and possibly to thin out the weaker ones, if they are abundant

Varieties.

No winter care is needed at all with the varieties which I have grown. These are, the Marlboro for early berries, and the Cuthbert for late. The Marlboro is a firm berry, and I think the most profitable. I like to have both, but not in the same row. The Loudon is a great yielder, but inclined to crumble. Nevertheless it is a very good berry, and a fine cropper. It is medium early. There is nothing better, however, than the Marlboro and the Cuthbert. If a young orchard is set with the trees 30 feet or more apart, a raspberry crop could be grown for eight or ten years by keeping the plants well away from the trees. I destroyed my plantation partly on account of the trees coming into bearing, and partly for other reasons, but the first is sufficient to my mind.

Prices.

Prices of late have improved, and I think where one can grow upwards of 2,000 quarts per acre this crop is a very profitable one. I would treat blackberries precisely as I do raspberries.

GOOSEBERRY CULTURE.

James Allan.

Gooseberries are not grown as extensively in this country as in Great Britain. The climatic conditions here may not be quite as favorable for their culture as in the British Isles, but if they are planted in good soil and given proper care the returns will well repay the effort put upon them. In some sections the English varieties will not do as well as the American, being more subject to mildew than the latter, but where the climatic conditions are similar to those of Great Britain this trouble is not likely to occur. The American varieties as a rule succeed better in this country than the English varieties and give quicker returns.

Propagation.

Gooseberries may be propagated from seeds, from cuttings or by layering. For a few full grown plants layering will give the quickest results. Any strong shoot long enough to bend to the ground without breaking laid down in July and covered with loose earth will take root by fall. (See page 16).

Hardwood cuttings taken in the fall and either planted out then or stored till spring and then planted out will give fair-sized plants by the next fall (See page 15).

If grown from seed the plants are not likely to be the same as the parent. Occasionally they are improvements on the parent plant. It is in this way that new varieties are obtained. (See page 14).

Soil.

Gooseberries thrive on cool, moist soils. A clay loam suits this fruit better than a light soil. When planted on clayey soils the foliage is held on the bushes better than when planted on light sandy soils. If the foliage drops early in the season the berries will be injured by the hot sun and the bushes weakened for next year's crop.

Preparation of the Ground.

In preparing the ground for planting it should be freed as far as possible from all noxious weeds, especially any perennial weeds, such as couch grass. This will save much trouble in the later care of the plantation. The land should be made as rich as possible. The gooseberry is a gross feeder and will stand heavy manuring and fertilizing. A good coat of manure should be plowed under in the fall and rotted manure might be advantageously applied in the spring. It should be well worked into the soil. The ground should be brought into good tilth by frequent harrowing, and rolling if necessary before planting.

Planting.

Gooseberries start into growth very early in the spring. The planting should therefore be done as early as the ground can be prepared. Some even recommend fall planting. Furrows for the rows should be opened with a plow, or holes dug for the plants with a spade. The rows should be six feet apart and the plants five feet apart in the row. This gives room for cultivation cross wise and length wise of the plantation if a large area has been planted. Last year's layers or one-year old cuttings make good plants for setting in the permanent plot. In setting the bushes the roots should be carefully spread out in the hole or furrow and good top soil first put in around them. This should be firmly packed down by tramping and then covered with an inch or two of loose soil to act as a mulch.

Cultivation.

It is important to give thorough cultivation right through the season, which for gooseberries is considerably longer than for annual crops. The roots being near the surface the cultivation should be shallow near the plants. Weeds should not be allowed to get a foothold since they seriously injure the gooseberry plantation and reduce the yield. An application of well rotted manure should be put on each fall and be worked into the soil in the spring.

Pruning.

The American method of growing gooseberries is to train the plants in the form of a bush with several stems, but with no branches trailing to the ground. This style of training is better adapted to the conditions of this country than is the English style where the plants are trained to a single stem. Heavy snow falls are likely to break down bushes trained in the latter way, but the spread of mildew is better prevented by having the head raised up on a single stem. There is then a better opportunity for a free circulation of air. About five or six strong shoots should be selected to form the top and all the weak shoots cut out. The shoots which are retained should be arranged so as to form an open head and to allow of a circulation of air. As time goes on some of the older wood should be removed to make room for younger and stronger shoots. Wood which is three years old or older should generally be removed. The fruit is borne on one-year old shoots, or on spurs on the older wood. All weak shoots near the ground and in shaded positions should be cut off. Any side shoots on old wood should be cut back or be entirely removed if the top is too dense. This provides for a free circulation of air and makes the picking easier.

The most common insect pest of the gooseberry is the currant worm. This insect eats the foliage and will soon strip the bushes if prompt measures are not taken to prevent it. It is easily controlled by the use of Paris green, arsenate of lead or white hellebore applied as a spray or a dust. (See page 116).

The varieties now being grown by the Horticultural Division at the Agricultural College are:

1. American: Downing, Houghton Seedling, Pearl and Red Jacket.
2. English: Berry's Early Kent, Lancashire Lad, Glenton Green and Pitmanston Green Gage.

Both English and American varieties are doing well.

LEGISLATION IN FORCE IN NOVA SCOTIA TO PREVENT THE IMPORTATION AND SPREAD OF INSECTS AND DISEASES INJURIOUS TO PLANTS.

By W. H. Brittain, Provincial Entomologist.

A considerable proportion of the worst enemies of plant life on this continent are of foreign origin and some of them are of comparatively recent importation. Realizing the importance of preventing the further introduction of such pests, the various federal, state and provincial governments have, of late years, brought into force various regulations providing suitable machinery for dealing with this danger.

The following pages only deal with provincial legislation; a full account of the Dominion regulations, which refer to Nova Scotia in common with the rest of Canada, may be found in Bulletin No. 12, Second Series, Department of Agriculture, Ottawa. In general explanation it may be said, that inspection of nursery stock from other parts of Canada and also, by agreement with the Dominion Government, from the United States of America, is performed by provincial inspectors. Stock originating in other countries is inspected by officials of the Dominion Entomological Branch. The authority under which the inspection of the Dominion and the provincial inspectors perform their duties will be found in the Dominion Act entitled "The Destructive Insect and Pest Act," and the provincial statute entitled, "The Injurious Insect Pest and Plant Disease Act, 1911," and the various regulations issued under these two Acts.

The Provincial Act.

The following is the text of the Provincial law:—

An Act to Prevent the Introduction and Spread of Insects, Pests, and Plant Diseases Destructive to Vegetation.

(Passed on the 31st Day of March, A. D. 1911)

Be it enacted by the Governor, Council and Assembly, as follows:—

1. This Act may be cited as "The Injurious Insect Pest and Plant Disease Act, 1911."

2. In this Act and in any regulation made thereunder, unless the context otherwise requires:—

"Vegetation" means any tree, shrub, vine or plant, or the fruit of any portion whatsoever of a tree, shrub, vine or plant.

"Inspector" means an inspector or other officer appointed under the provisions of this Act for carrying out this Act.

3. This Act shall apply only to such plant disease, insects and pests as the Governor-in-Council may from time to time declare to be injurious to vegetation and subject to this Act.

4. The Governor-in-Council may from time to time make such regulations as are deemed expedient to prevent the introduction into the Province of Nova Scotia or the dissemination therein of any such plant disease, insect or pest.

5. Such regulations may provide:—

(a) that except as is otherwise provided in such regulations, it shall be unlawful for any person to have in his possession in the Province, or in any particular part thereof at any time or during any particular time or times, any vegetable or other matter that the Governor-in-Council deems to be likely to introduce into the Province or to disseminate therein any such plant disease, insect or pest;

(b) the terms of conditions upon which any person may lawfully have in his possession any such vegetable or other matter;

(c) for the treatment and method of treatment to be given to any vegetation, vegetable matter or premises, to eradicate, or control, or to prevent the spread of any such plant disease, insect or pest, and such regulations may prescribe whether such treatment shall be given by the owner or by a person appointed for the purpose;

(d) for the treatment, prior to the sale or disposal thereof of any vegetation or vegetable matter infected with any such plant disease or pest;

(e) that the occupier of the premises on which is discovered any such plant disease, insect or pest, shall immediately notify the Secretary for Agriculture thereof, and shall also send specimens of such plant disease, insect or pest, to the said secretary;

(f) for the seizure and confiscation of any vegetable matter and the container, if any, in respect to a breach of this Act, or of any regulation made thereunder, is committed;

(g) generally for or respecting the doing or abstaining from the doing of any act, matter or thing whatsoever that the Governor-in-Council may deem expedient for carrying out this Act, whether such regulations are of the kind enumerated in this section or not.

6. The Provincial Secretary may appoint inspectors and such other officers as he deems expedient for carrying out this Act and the regulations made thereunder. Such inspectors and other officers shall act under the direction of the Secretary for Agriculture.

7. Any inspector may enter any place or premises whatsoever in which he suspects that any such plant disease, insect or pest exists.

8. Any person contravening or neglecting to carry out or offering any hindrance to the carrying out of any provision of this Act, or of any regulation made thereunder, shall be liable, upon summary conviction, to a fine of not less than twenty dollars, nor more than one hundred dollars, together with costs, and in default of payment to imprisonment for a period of not less than ten or more than thirty days.

9. Every Order-in-Council made under this Act shall be published in two successive issues of the Royal Gazette, but every such Order-in-Council and every such regulation shall nevertheless be in force on and from the date on which the same is made.

10. The Black Knot Act, Chapter 63, of the Revised Statutes of Nova Scotia, 1900, and the San Jose Scale Act, Chapter 64, of the Revised Statutes of Nova Scotia, 1900, are repealed.

Amendments.

On May 14, 1914, the Act was amended as follows:

1. Section 3 of Chapter 3 of the Acts of 1911, entitled, "An Act to Prevent the Introduction and Spread of Insects, Pests and Plant Diseases Destructive to Vegetation" is repealed and the following substituted therefor:—

2. This Act shall apply to such plant diseases, insects and pests as the Governor-in-Council may, from time to time, declare to be subject to the Act.

On April 15, 1915, the Act was amended as follows:—

Section 5, Chapter 3 of the Acts of 1911, entitled "An Act to prevent the introduction and spread of insects, pests and plant diseases destructive to vegetation," is amended by adding thereto the following additional clause:—

(h) for the payment of such fees as are thought necessary to meet the cost of inspection and fumigation at the port of entry.

Regulations.

The following regulations are those that have been passed from time to time under the provisions of the Injurious Insect Pest and Plant Disease Act, 1911. Regulations that have been modified or repealed are omitted.

1. *Definitions.*

"Provincial Entomologist" means the person appointed as such for carrying out the provisions of "The Injurious Insect, Pest and Plant Disease Act, 1911", or under the provisions of any other statute.

"Inspector means a person appointed for carrying out the provisions of said Act and the regulations made thereunder.

"Nursery Stock" means and includes all trees, shrubs, plants, vines, grafts, scions, cuttings and buds, but shall not include green-house grown plants, herbaceous perennials and bedding plants.

Insects and Plant Diseases Subject to the Act.

The following plant diseases and insect pests have been declared to be subject to the Injurious Insect, Pest and Plant Disease Act, 1911, viz:

The San Jose Scale (Aspidiotus perniciosus Comst.); the Brown-tail Moth (Euproctis chrysorrhoea L.); the Gypsy Moth (Porthetria dispar L.); the Woolly Aphis (Schizoneura lanigera Hausm.); the Black Knot (Plowrightia morbosa Sac.); Apple Canker (Nectria ditissima Tul.); Powdery Scab of Potatoes (Spongospora subterranea); Fire Blight (Bacillus amylovorus); Apple Maggot (Rhagoletis pomonella Walsh); Cherry Fruit Fly (Rhagoletis cingulata); Cherry Fruit Fly (Rhagoletis fausta).

Duties of General Public as Regards Pests Subject to the Act.

1. Except as is otherwise provided in these regulations, it shall be unlawful for any person to have in his possession, offer for sale, or otherwise dispose of in the Province at any time, any vegetable or other matter that is infested with any such insect, pest or plant disease, said vegetable or

other matter being deemed and hereby declared by the Governor-in-Council to be likely to introduce into the Province and disseminate therein such plant diseases, insects and pests.

2. The occupier of the premises on which is discovered any such plant disease, insect or pest shall immediately notify the Secretary for Agriculture thereof, and shall also send specimens of such plant disease, insect or pest to the said secretary, and shall give him all the information possible in reference to any such infestation.

4. The owner of the premises on which is discovered any such plant disease, insect or pest, or on which an inspector suspects that any such plant disease, insect or pest exists, shall, within ten days after being notified in writing by an inspector to do so, give such treatments as are recommended by the Secretary for Agriculture.

Powers of the Secretary for Agriculture and of the Inspectors Appointed for Carrying out the Provisions of the Act.

1. The Secretary for Agriculture may authorize, by writing under his hand, any person to have in his possession, in the Province of Nova Scotia, any such plant disease, insect or pest for the purpose of scientific investigation only.

2. If any such plant disease, insect or pest is discovered in any nursery, the Secretary for Agriculture shall, on the report of an inspector, inform the owner, manager or lessee of such nursery of the fact, and no vegetation shall be removed from such nursery until permission in writing so to do has been obtained from the Secretary for Agriculture.

3. Any inspector may forthwith seize and confiscate any vegetable matter and the container, if any, in respect to which a breach of said Act or of any of these regulations is committed.

4. Where any inspector finds San Jose Scale present on any trees, he may order the immediate destruction of such trees, and such order shall be carried out under the supervision of the inspector and in such manner as he may direct.

5. Any inspector may himself destroy any trees which he finds infested as aforesaid.

6. Any order for destruction made hereunder may include the destruction of any trees which in the opinion of the inspector, by reason of their proximity to trees having thereon living scale, may have them infected.

Regulations Regarding the Importation of Nursery Stock.

1. *Certification.*

(a) No imported nursery stock shall be delivered to any importer or consignee within the province of Nova Scotia unless the same is accompanied by a certificate signed by such Provincial Entomologist or other authorized Government Officer as is approved by the Secretary for Agriculture, that the nursery or other premises on which the same was grown was inspected within the period between the fifteenth day of June and the fifteenth day of September next preceding the shipment thereof, and that said nursery or other premises were found to be apparently free from San Jose Scale and such other plant diseases, insects and pests as have been declared to be injurious to vegetation by the Governor-in-Council under the provisions of "The Injurious Insect Pest and Plant Disease Act, 1911", provided that any importation of nursery stock which has complied with the regulations of the Department of Agriculture of Canada shall be exempted from the provisions of those regulations, except any importation or nursery stock from the United States of America.

(b) No common carrier, express company or any other person, firm or corporation shall send, bring or cause to be sent or brought into the Province of Nova Scotia, for delivery within the Province, any nursery stock unless the certificate mentioned in the next preceding regulation, or a duplicate thereof, is attached to each parcel or bundle thereof, provided however, that if such nursery stock is contained in a sealed car containing no other goods, such certificate may be attached to the car.

2. *Duties of Importers of Nursery Stock and of Agents of Carrying Companies, with Respect to the Act.*

(a) Every person who imports nursery stock shall give notice to the Provincial Entomologist, Agricultural College, Truro, within five days of giving the order for the same, and shall again notify the Provincial Etnomologist on the arrival of the shipment in Nova Scotia. Notice shall also be given the Provincial Entomologist by every common carrier, express company or other person, firm or corporation bringing nursery stock into Nova Scotia, for delivery within the Province immediately such nursery stock is received. Such notice shall include the name of the consignor and consignee, the points of origin and destination, the name of the company or person carrying the nursery stock, as well as the nature, quantity and origin of same.

(b) At the ports hereinafter mentioned all importations of nursery stock shall be inspected and fumigated in the fumigation house provided for that purpose, and a certificate of fumigation will be issued by the Provincial Entomologist, and no nursery stock shall be delivered by any common carrier, express company or any other person, firm or corporation, unless such certificate has been obtained.

(c) If, for any reason, any package or packages of nursery stock from any other province of Canada or from the United States of America, should arrive at its destination without a certificate signed by the Provincial Entomologist, then such package or packages shall immediately be shipped back to the nearest fumigation station for inspection and fumigation.

The agent of any carrying company who delivers any such package or packages of nursery stock without such a certificate, or any person accepting delivery of the same, shall be guilty of a contravention of the Act.

3. *Ports of Entry and Duration of Inspection Seasons.*

(a) No nursery stock shall be brought into Nova Scotia for delivery within the Province except at or through the ports of entry and during the periods hereinafter mentioned; that is to say:—Digby, Digby Co., from March 15th to May 15th, and from Oct. 7th to December 7th. Truro, Colchester Co. from March 15th to May 15th, and from October 7th to December 7th.

(b) The Secretary for Agriculture may prescribe for the purpose of this regulation, any port at which the use of a Dominion fumigation station is available.

(c) Importations by mail are prohibited.

(d) The Secretary for Agriculture, at his own discretion, may permit, by writing under his hand, any person importing nursery stock into Nova Scotia, to have the same inspected and fumigated on such person's own premises, provided that such nursery stock is imported in not less than car-load lots, and facilities are provided to the satisfaction of the Provincial Entomologist; such nursery stock to be inspected and fumigated in the presence of a duly qualified inspector, who shall thereupon issue a certificate of inspection and fumigation.

4. *Marking of Packages and Responsibility for Possible Losses.*

There shall be clearly marked or otherwise indicated on every package of nursery stock intended for delivery within the Province of Nova Scotia, the port at or through which such nursery stock is to be bought, and all shipments of nursery stock shall be entirely at the risk of the shippers or consignees, the Government assuming no responsibility whatever.

5. *Disposal of Infested Material.*

If, on inspection, nursery stock or other vegetation or vegetable matter is found to be infected with the San Jose Scale, or any other plant diseases, insects, and pests as have been or may hereafter be, declared to be injurious to vegetation by the Governor-in-Council, under the provisions of the "Injurious Insect Pest and Plant Disease Act, 1911," such nursery stock shall be destroyed to the extent deemed necessary by the inspector, and in his presence, or, if required by the consignee, shipped out of the Province at the extense of the consignee. All cases, packages and packing in which such nursery stock has been contained shall also be destroyed in the same manner.

6. *Inspection Fees.*

The fees which shall be paid, and which are thought necessary to meet part of the cost of inspection and fumigation at the Ports of Entry, shall depend upon the class of nursery stock to be imported, as will be hereinafter explained.

A minimum fee of not less than 30 cents shall be paid on all shipments, however small. This minimum fee may be increased to a sum not exceeding 50 cents at the discretion of the inspector, when, in his estimation, conditions warrant the increase. In cases where the charge is not stated for any given number of trees, this minimum charge shall apply.

Class I.

This class shall consist of fruit and ornamental trees, all kinds, 5 feet high and upwards, the measurement not to include roots, but only that part which stands above the surface of the ground when planted. It includes apples, pears, cherry, plum, peach and other fruit trees, together with shade and ornamental trees of all kinds.

Not exceeding 25 trees, a fee of 4 cents per tree.

Exceeding 25 trees, a fee of $1.00 for the first 25 trees and 3 cents per tree for each tree over 25 but not exceeding 50.

Exceeding 50 trees, a fee of $1.75 for the first 50 and 2 cents per tree for each tree over 50 but not exceeding 100.

Exceeding 100 trees, a fee of $2.75 for the first 100 trees and ½ cent per tree for each tree over 100 but not exceeding 250.

Exceeding 250 trees, a fee of $3.50 for the first 250 trees and 2-5 cents per tree for each tree over the first 250 trees.

Class II.

This class shall consist of fruit and ornamental trees as described in Class I, but under 5 feet in height, and also including ornamental shrubs 3 feet high or over; roses of all kinds and bush fruits, gooseberries, currants etc., two years old or more.

Not exceeding 50 plants a charge of 2 cents per plant, provided the fee totals not less than 30 cents, in which case the minimum fee shall apply.

Exceeding 50 plants, a fee of $1.00 over the first 50 and ½ cent per plant for each plant over the first 50, but not exceeding 250 plants.

Exceeding 250 plants, a fee of $2.00 for the first 250 plants; for every 50 plants, or fractional part of 50 plants, after the first 250 plants, an additional fee of 15 cents.

Class III.

This class shall consist of ornamental shrubs under 3 feet high, ornamental vines and creepers; hedge plants over 12 inches high; bush fruits one year old; also cuttings, scions, etc.

Not exceeding 50 plants a charge of 2 cents per plant, provided the fee totals not less than 30 cents, in which case the minimum fee shall apply.

Exceeding 50 plants, a fee of $1.00 for the first 50 and ½ cent per plant for each plant over the first 50, but not exceeding 250 plants.

Exceeding 250 plants, a fee of $1.70 for the first 250 plants, and for every 100 plants or fractional part of 100 plants after the first 250, an additional fee of 25 cents.

Class IV.

This class includes nurserymen's importations for transplanting and growing in nurseries in Nova Scotia. It includes root grafts, dormant buds, fruit tree seedlings, fruit tree stock of all kinds, scions, bud sticks, etc.

Not exceeding 500 plants the fee shall be the same as under Class 3.

Exceeding 500 plants the fee shall be $2.35 for the first 500, and for every 100 plants or fractional part of 100 plants, after the first 500, an additional fee of 20 cents.

Class V.

This class shall consist of cane fruit of all kinds, raspberries, blackberries, etc., and of grape vines.

Not exceeding 50 plants, a fee of 30 cents shall be charged.

Exceeding 50 plants a fee of 30 cents for the first 50 and 2-5 cent additional for each plant over 50, but not exceeding 250 plants.

Exceeding 250 plants, a fee of $1.10 for the first 250 and for every 100 plants or fractional part of 100 plants, after the first 250 plants, an additional fee of 20 cents.

Where the invoice price of any shipment, as is shown by the invoice submitted to H. M. Customs for entry of said shipment, in the case of goods originating outside the Dominion of Canada, or in an invoice accompanying the manifest in the case of goods from other Provinces in the Dominion of Canada, shall equal or exceed the sum of $75.00, then the charges shall be computed according to the least charge made under any or all, class or classes, without regard to any certain number in any one class.

Importers of stock from other parts of the Dominion of Canada, who wish to avail themselves of this minimum rate, must have their manifest accompanied by an invoice showing the value of the goods to be in excess of $75.00. The value expressed in said invoice must reasonably agree with the known wholesale market prices current at the time of importation. If the inspector has reason to believe that the price expressed in the invoice does not represent the real value of the goods, he may require the invoice to be sworn to, or where this is not practicable, may value the same himself, according to the prevailing market price, and his decision in this matter shall be final.

An additional charge not exceeding 50 per cent of the regular charge, may be made at the discretion of the inspector, when from indifference or neglect on the part of the importer of the stock, the work of the inspector is made more difficult in any way. For example where additional expense is required for the disinfection or destruction of infested stock, or where the importation would naturally be subject to greater risks of infection than would naturally obtain if the importer had exercised due care to avoid infestation in making his purchases, or where the stock is notably defective in quality, etc.

A discount not exceeding 25% of the regular charge may be made, in exceptional cases, at the discretion of the inspector, when conditions are such that the work of the inspector is greatly lessened, as in cases where the importer buys the stock in a market known to be free from all dangerous pests, makes his purchases in car-load lots packed in the cars without boxes, etc.

In all matters of classification, the inspector is not bound to have regard to the description given or implied by the invoice or other description accompanying the shipment; the matter of classification shall always be at the discretion of the inspector making the examination. In cases of appeal from the decision of the local inspector, the matter shall in all cases be referred to the Provincial Entomologist, whose decision shall be accepted as final.

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Annual Report

OF THE

SECRETARY FOR AGRICULTURE,

NOVA SCOTIA

FOR THE YEAR 1917

(Printed by Order of the Legislature.)

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HALIFAX, N. S.
Commissioner of Public Works and Mines
King's Printer.
1918

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AGRICULTURE

REPORT OF THE SECRETARY FOR AGRICULTURE FOR THE YEAR 1917.

The Honorable George H. Murray,

Provincial Secretary.

Sir:—In accordance with the requirements of the Act for the encouragement of Agriculture, I have the honor to submit my annual report for the year 1917, which contains a statement of the work done during the year under the provisions of the Act and by authority of His Honor, the Lieutenant Governor-in-Council.

This report embraces the following documents:—

Part I.—My Annual Report as Secretaryfor Agriculture **for Nova Scotia, P. I.**

My Report as Principal of the Agricultural College, Truro, being the twelfth Annual Report of the Nova Scotia Agricultural College and Farm. P. 18.

Report of the Farm Superintendent and Professor of Agriculture. P. 20.

Report of the Professor of Botany. P. 50.

Report of the Provincial Entomologist and the Professor of Zoology. P. 60.

Report of the Professor of Horticulture. P. 78.

Report of the Superintendent of the Poultry Department. P. 100.

Report of the Superintendent of Dairying. P. 111.

Report of Chemist. P. 125.

Report of the Superintendent of Women's Institutes. P. 175.

Part II.—Report of Agricultural Societies, Associations, Exhibitions, Meetings and Field Crop Competitions. Pp. 1 to 143.

I have the honor to be, Sir,

Your obedient servant,

M. CUMMING,

Truro, Feb. 1st, 1918.
Secretary for Agriculture.

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N.S.A.C. Short Course
Truro. N.S. Jan. 2nd – 10th 1918

Part of the students who attended the Short Course at the College of Agriculture, Truro, N. S., January 2nd–10th, 1918.

PART I

AGRICULTURE

REVIEW OF THE WORK OF THE AGRICULTURAL DEPARTMENT OF THE GOVERNMENT OF NOVA SCOTIA.

The Honorable George H. Murray
Provincial Secretary,
Halifax, N. S.

Sir —Beginning with the year 1907 and continuing up to last year there has been issued as a part of the Report of the Secretary for Agriculture a section containing popular educational articles on various branches of Agriculture. The inclusion of these educational articles has seemingly added to the usefulness and popularity of this annual report. Now, however, that the various divisions of the Department have expanded their work it requires a much larger volume to contain an account of this work than heretofore. The present report will therefore differ from the preceding ten reports in that the popular educational articles will be omitted. It will hence contain two parts instead of three, as follows:

Part 1—The General report of the Secretary for Agriculture and reports of the various officers of the Department and of the College of Agriculture.

Part 2—Report of the Superintendent of Agricultural Societies and Associations and Exhibitions, dealing with (a) Agricultural Societies, (b) County Farmers' Associations, (c) County Exhibitions, (d) Field Crop Competitions and Field Demonstration Work.

SEASON OF 1917.

Whereas the season of 1916 was described in the previous year's report as a season free from extremes of all kinds and generally favorable for farming, that of 1917 must be described, from the standpoint of the production of crops, as considerably inferior. To begin with, seeding was, on an average, fully two weeks later than in the preceding year. In some localities spring frosts occurred up to the middle of June and on the majority of farms the greater part of the seeding was done after that date. The conditions following the seeding season and continuing well into the summer were extremely favorable to the growth of all kinds of plants. But unfortunately on Aug. 10th, a south west gale, one of the heaviest that ever visited the Province, wrought immense damage to the field crops and fruit trees in Western Nova Scotia and very considerable damage to these crops in the East. On Sept. 7, 8 and 9 a most blighting frost, which affected a large part of America froze potato vines, garden truck, buckwheat and other vegetation causing thereby enormous loss. This severe frost occured over a month earlier than the corresponding frost of 1916. Had it not been for the damage effected by the gale and by this frost, the unusually favorable conditions of growth that prevailed during the summer months would have more than made up for the delayed seeding. However, the combined conditions resulted in about a 10% less aggregate tonnage of the crops of the Province than in the previous year. In Western Nova Scotia the most serious shortage was with the grain crops generally. In Eastern Nova Scotia the grain crops were for the most part above average but hay was a much reduced crop. Potatoes and roots of all kinds were fully up to average in practically every part of the Province.

The fruit men had another slim year. It is a bit too early to give definite figures but the most reliable we have indicate a crop of from 500,000 to 600,000 barrels of export apples and an additional 100,000 barrels that were consumed in the evaporators etc. While this crop was at least as good as that of the preceding year, it was but little over one-third of the record crop of 1911. Owing to the British embargo against fruit, the Nova Scotia crop had to be marketed in America. Fortunately for Nova Scotia the Ontario apple crop was a failure in consequence of which the Canadian market offered facilities for marketing the whole crop at very satisfactory prices.

Pastures were unusually good and in consequence live stock thrived. Dairy production increased about 5% and reports received indicate about a corresponding increase in beef, and mutton and wool and pork.

The following records from the College Farm indicate the peculiarities of the season which we have described in the foregoing. The first seeding on the College Farm was a field of oats sown on April 25th, which was within four days of the earliest seeding on record for some years. However, for the ensuing four weeks, practically no further seeding was done and a very large part of the seeding was carried on up to the middle of June. Haying began on July 20th, nine days later than in 1916, but owing to continued wet weather, the last of the hay was not hauled to the barn until the end of the first week of September, over two weeks later than in a normal year.

The following table contains a record of the maximum and minimum temperatures for each month of the year and of the precipitation for each month of 1916 and 1917. These records were taken at the College Farm, Truro, where the precipitation is usually from 30% to 50% lower than on the coast and where the temperature extremes are considerably greater than on the coast.

MONTH	Temp. Maximum	Temp. Minimum	Precipitation 1917	Precipitation 1916
January	52.0	−20.0	2.20	2.60
February	45.0	−18.0	Traces	2.12
March	56.0	−2.0	1.1	2.00
April	57.0	18.0	1.15	3.10
May	62.0	23.0	3.4	1.48
June	81.0	30.0	3.40	2.20
July	82.0	41.0	2.75	3.46
August	81.0	45.0	5.36	2.20
September	72.0	27.0	4.90	1.00
October	70.0	27.0	5.35	4.30
November	52.0	15.0	1.50	2.50
December	51.0	−18.0	3.16	4.30
Total			34.27	31.26

LIVE STOCK.

Last year the correspondents upon whose statements the crop report was issued almost universally reported an increase of live stock of all kinds. The report for the current year is of the same character. We are free to confess that it was our opinion that, under the abnormal condition prevailing, the numbers of live stock were being somewhat decreased but the almost universal report to the contrary seems to bear out the figures submitted below in which 100% is taken for the amount of live stock on hand in 1916 and relative figures presented for the corresponding numbers in 1917.

Class of Live Stock	Percentage in comparison with 100 in 1916.
Dairy Cattle	104 per cent
Beef Cattle	101 " "
Horses	101 " "
Sheep	106 " "
Hogs	104 " "
Poultry	104 " "

TOTAL YIELDS FOR 1917.

The following table contains the estimated returns of the various crops in the Province during 1917. Based upon the Dominion Decennial Census of 1911 and estimated increases since then.

Crop	Acres	Yield per acre Bushels	Total Yield Bushels
Oats	132,141	29	3,832,089
Wheat	20,405	19	387,695
Barley	5,978	24	143,472
Buckwheat	12,553	19	238,507
Peas	222	16	3,552
Beans	1,385	22	30,470
Rye	1,160	17	19,720
Mixed Grains	4,443	26	115,518
Corn for Husking	179	35	6,265
Potatoes	43,465	175	7,606,375
Turnips	13,479	516	6,955,164
Mangels	1,256	456	572,736
		Tons	Tons
Hay	515,310	1.7	875,027
Corn for Forage	800	12	9,600
Other Forage Crops	1,550	12	18,600
Apples	700,000 barrels.		

ESTIMATED NUMBERS OF LIVE STOCK IN NOVA SCOTIA.

Horses	81,305
Milch Cows	157,433
Other Cattle	176,060
Sheep	247,189
Swine	65,023
Poultry	1,252,127

COLLEGE OF AGRICULTURE AND FARM.

The enrolled attendance in the regular classes at the College is 63, in comparison with 54 the previous year and 114 before the war broke out. It should be explained that, since the breaking out of war, the average age of students at the institution has been considerably lower than formerly, over four-fifths being less than twenty years of age. Included among this number are three girls who are taking the same course as that which is prescribed for boys.

The Short Course held during the first two weeks of January was the most largely attended one in the history of the College. Over 400 pupils attended and the average enrolment throughout all the sessions of the course was approximately 250. A Woman's Short Course attended by 41 was held at the same time and proved equally successful. At date of writing the Short Course for 1918 has commenced. Unfortunately a snow storm has tied up the railway service in the east as a result of which practically no students have so far reported from there. The present attendance hailing mostly from the West is about 150.

No material change has been made during the year in the College Buildings or in the staff or in any of the more important details of management. Farmers to a much greater extent than heretofore have applied to the various divisions of the College for information and likewise practically every division has materially developed its work during the year. A detailed report of each of these divisions will be found in subsequent pages of this publication.

THE NOVA SCOTIA FARMERS' ASSOCIATION.

The 1917 meeting of the Nova Scotia Farmers' Association was held at Amherst. It was planned to hold the 1918 meeting in Halifax but it is altogether likely that, owing to the disaster which befel that City on Dec. 6th last, the place of meeting will be changed. This Association issues an Annual Report which may be secured on application to C. R. B. Bryan, Secretary Nova Scotia Farmers' Association, Truro, N. S.

COUNTY FARMERS' ASSOCIATIONS.

In 14 out of 18 Counties of the Province there are County Farmers' Associations which are branches of the parent Provincial Farmers' Association. There has been no change in the number of County Associations during 1917. Several have materially increased their membership. In two counties at least the County Association has been responsible for the formation of co-operative organizations, the development of which will considerably change the complexion of the original County Association. A detailed report of these associations will be found in part 2 of this publication.

THE NOVA SCOTIA FRUIT GROWERS' ASSOCIATION.

The 1917 meeting of this Association was held at Lawrencetown. The meeting for 1918 will be held at Kentville. The Annual Report of this Association for the year was an unusually good one. Three thousand extra copies were circulated among the fruit growers of the Valley. A copy of the report may be secured on application to M. K. Ells, Secretary, Port Williams, N. S.

THE DAIRYMENS' ASSOCIATION OF NOVA SCOTIA.

This Association, now in its sixth year, is composed of the managements of the creameries and cheese factories and the butter and cheese makers in the factories of the Province. It has been a very effective organization. The next Annual Meeting will be held on Jan. 10 and 11, following which the first separate report of this Association will be issued and circulated. The Secretary of the Association from whom further information may be obtained is W. A. McKay, Dairy Superintendent for the Province.

THE NOVA SCOTIA POULTRY ASSOCIATION.

This Association, now in its seventh year, will hold its next Annual Meeting on Jan. 10th. The major part of its work to date has had to do with the development of Poultry Shows throughout the Province. The Secretary is J. P. Landry, Truro, N. S., Poultry Superintendent for the Province of Nova Scotia.

THE NOVA SCOTIA ENTOMOLOGICAL SOCIETY.

This Association is now three years old. The Annual Meeting was held on Aug. 2nd, last. A report of this meeting and of the general work done during the year may be secured on application to the Secretary, W. H. Brittain, Provincial Entomologist, Truro.

AGRICULTURAL SOCIETIES.

During the year, 17 new societies have been organized and 2 have been resuscitated. On the other hand, 6 societies have dropped out and at date of writing 6 more are in a doubtful position. At least 275 societies, an increase over last year of 12, will be in existence during the next year.

The most striking features of the Agricultural Society development of the Province are (a) larger subscriptions from individual members; (b) a marked tendency for buying a higher class of live stock; (c) a greater interest in caring for live stock owned by societies; and (d) the rapid increase of Agricultural Societies in the Eastern end of the Province. A full report of these societies and their work will be found in the report of F. L. Fuller, Superintendent, in part 2 of this publication.

EXHIBITIONS.

Measured by attendance the Provincial Exhibition held at Halifax in Sept. last, was the most successful since the holding of the Dominion Exhibition, at Halifax. The exhibits, somewhat reduced owing to the difficulties of the labor situation with which farmers are now confronted, were fully up to average in quality. The financial statement was a most satisfactory one. There were also held during the year 12 county exhibitions which received special grants from the Government and in addition a number of smaller local shows held in the interest of the smaller communities, but not receiving any special grant.

In addition to these exhibitions, 7 Seed Fairs including the Provincial Seed Fair at Truro, and a like number of Poultry Shows, to all of which special grants were given, were held during the year. School Fairs have been developed in this Province under the direction of the Director of Rural Education, L. A. DeWolfe, whose report will be found in the report of the Superintendent of Education.

FIELD CROP COMPETITIONS.

1917 was the banner year for Field Crop Competitions in the Province. This has been most opportune for these Field Crop Competitions have proven the means of developing the home growing of seed oats and wheat and potatoes to an extent which will not only save many dollars to the farmers of the Province but will give the usually larger returns which follow the use of home grown acclimated seed, provided it is properly selected. In all there were 415 contestants divided as follows:

Wheat Growing Competition	117
Oat Growing Competition	154
Potato Growing Competition	95
Turnip Growing Competition	49
Total	415

A new Field Crops Competition organized during the year was that arranged by the Halifax Board of Trade. Substantial prizes were offered for farms best managed in the interests of increased food production. Something over 200 farmers entered this Competition, which possessed the splendid merit not only of encouraging better farming but also of interesting the city man in the farmer's work.

A full report of all these competitions will be found in part 2 of this publication.

DAIRYING.

As near as may be estimated, there was an increase in the dairy products of Nova Scotia amounting to about 5%. The creameries record an increase in their output of 174,192 lbs. equal to approximately a 10% increase over the previous year's output. While this is not as large an increase as has been recorded for several preceding years, it must, in the light of the increasing labor difficulties and high prices of feed, be regarded as very satisfactory.

A special effort has been made to improve the quality of the butter manufactured in the creameries of the Province. In connection with this, butter made in factories of the Province has been kept in storage since the summer and will be scored at the Dairymen's Convention at Truro on Jan. 10th next and substantial prizes awarded to the management of those creameries whose butter receives the highest report from the judges. Details will be found in the report of W. A. McKay, Dairy Superintendent in a subsequent part of this publication.

CO-OPERATION.

In addition to the co-operative farmers' Organizations reported in 1916, we are pleased to report the organization and growth during the past year of a powerful organization known as the Pictou County United Farmers Limited, which now stands only second in volumn of business to the

United Fruit Companies, of Berwick. Several smaller co-operative farmers' bodies have also been operating during the year. In fact, there are now sufficient of these smaller and larger co-operative bodies to afford material for a very interesting and valuable report. In the meantime, the subject is little more than catalogued in this publication, but interested parties can secure further information by corresponding with the Secretary for Agriculture.

STALLION ENROLMENT.

61 more stallions were enroled with this Department under the Provisions of the Stallion Enrolment Legislation of 1912 and 1913 than during the previous year. A considerable part of this increase was due to the fact that two inspectors were sent out into the Province to secure information as to how well the Act was being complied with. These inspectors were instructed not to fine any owners travelling stallions, which were not enrolled, unless they found them unwilling to conform to the law. Since, in every case, the owners, when reported, immediately enrolled their horses, no penalties were inflicted. It is planned, however, to send out inspectors next year whose instructions will be to be much more drastic with respect to those who fail to comply with the law. This law requires that every owner of a stallion offered for service in the Province of Nova Scotia must have said stallion enrolled with the Department of Agriculture.

Our reports are to the effect that in some parts of the Province the law has already been responsible for a considerable improvement in the quality of stallions kept but in other parts of the Province little if any improvement has yet been effected. However, it is certainly to be hoped that the character of the stallions kept in Nova Scotia will be improved. Otherwise, the horse raising branch of farming is sure to become less and less profitable.

The following is a summary of the enrolment for 1917:—

Pure Breds.

Clydesdales	46
Standard Breds	50
Percherons	12
Hackneys	3
Morgans	1
French Coach	1
	113

Grades.

Grade Clydesdales	19
" Standard Breds	40
" Percherons	11
" Hackneys	6
" Shires	2
" French Coach	2
	80
Cross Breds and Others	74
Total number enrolled	267

Under the provisions of the law stallions may be inspected for soundness at the option of the owner; 46 stallions were so inspected during the current year of which 39 were sound and 7 were unsound.

HORTICULTURE AND MODEL ORCHARDS.

Altogether, 35 "Model Orchards" have been set out by the Department in the various counties of the province during the past 15 years. These orchards are under the superintendence of the Horticultural Division of the Department of Agriculture. A statement about these orchards will be found in the report of the Horticultural Division. Of particular interest is the fact that very good yields have been obtained in counties which are not considered to be in the fruit belt of the province. For example one of these orchards in Antigonish County, planted in 1904, yielded this year 71 barrels of apples and another set out in 1902 yielded 30 barrels of apples.

The Horticultural Division has also undertaken experimental work in renovating old runout orchards. An interesting account of the work will also be found in the Horticultural report.

Finally this report contains valuable comments and information on various phases of gardening, which has become a very important phase of food production in these war times

WHEAT GROWING.

During the year, four new roller process mills have either been completed or are in course of construction i. e. at Inverness in Inverness County, at Boylston in Guysboro County, at Bridgewater in Lunenburg County, and at Gore in Hants County. These mills in addition to the roller process mills recently erected at Baddeck in Victoria County and Berwick in Kings County have been assisted under the Department's policy for encouraging wheat growing. Those who are familiar with the province will recognize that all these mills, which have received assistance, have been erected in parts of the country where wheat growing had not previously been established to any extent and where consequently modern mills had not been erected.

There was an increase of probably from 3000 to 4000 acres in the wheat lands of the province last year. Owing to special conditions, the trade did not stock up with sufficient seed, and consequently the Department of Agriculture helped out the situation by handling directly and indirectly several thousand bushels. This year, in order to prevent any shortage of seed supply, the Department by the advice of "The Development of Agricultural Resources Committee," is prepared to buy at cost any surplus seed wheat that any firm or organization may have left from a carload or carload lots. Information in regard to this has been distributed in "Food Production Bulletin No. 1" on "Wheat Growing in Nova Scotia" which has just been issued from the press.

INSECT PESTS AND PLANT DISEASES.

The subsequent report of the Provincial Entomologist contains information to the effect that the Brown Tail Moth, which was first discovered in the province ten years ago, has not fortunately, made any progress, but has at least been kept in bound.

The report in addition to other information gives special advice on measures which should be adopted to prevent damage next year by the Canker Worm, the Zebra Caterpillar, the Potato Stem Borer, the Green Apple Bug, the Apple Maggot and other serious pests. The report contains a sub-report by Mr. Gooderham on his inspection of the Apiaries of the province. According to this report there is still considerable foul brood in the province. None the less heroic measures adopted in 1916 have proven very effective. This part of the report indicates the importance of adopting further measures to prevent damage by various diseases that effect bees.

WOMEN'S INSTITUTES.

One new Institute was organized during the year. This brings the total up to 50, and the total membership up to nearly 1700. These Institutes have made large contributions to the various Patriotic Funds, and have in many cases done splendid work in developing community life, especially in reference to the improvement of schools and various measures calculated to improve the social conditions. A special feature of the educational work for the past year has been the demonstrations in the canning of fruit and vegetables. Special literature has been issued, and in addition to local demonstrations, a particularly interesting and valuable display and series of demonstrations was made at the Provincial Exhibition. A full report will be found in the subsequent pages of this publication.

INCREASED PRODUCTION.

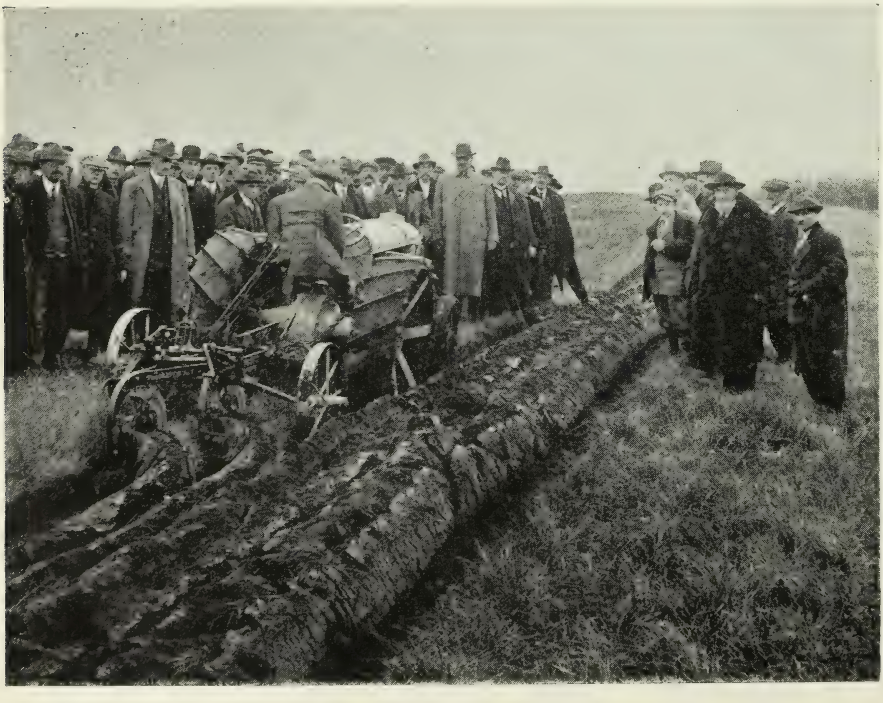
This Department has co-operated with the Federal Department in encouraging increased production. Whatever may be said of the campaign, there is no doubt that the publicity and appeal part of it reached every part of the country. Moreover hundreds of farmers responded to the appeal and helped by so doing to increase the food supplies of the country. Many of those, who actually responded, and many, who did not respond to the appeal urged the need of something more tangible than appeal. From the standpoint of our own Department we have to admit that, apart from education and direction of effort, not a great deal that might be called tangible was done. For information we briefly tabulate some of the lines of work which were responsible for increased production:

1. A joint effort was made with the Department of Education to place school boys on the farms, the result of which was that something over two thousand boys, and quite a number of girls too, did engage in farm work.

2. We co-operated with the Department of Industries and Immigration in the establishment of a Publicity and Labor Bureau through which considerable help was diverted from the towns and cities to the country. A fuller report of this will be found in the report of the Secretary of Industries and Immigration.

3. We co-operated with the National Service League with the result that considerable stimulus was given especially to town gardening. A most interesting feature of this work was a specific effort made by the members of

Part of the Crowd at the Big Tractor Demonstration and Plowing Match at Kentville, Oct. 12th, 1917.



The Ford Tractor Plowing Sod at Kentville Oct. 13th, 1917. Mr. Smith, one of Ford's Head Tractor Experts may be seen standing between Principal Cumming and F. L. Fuller. This is the tractor outfit which Mr. Ford presented to the N. S. Department of Agriculture.

"The Halifax National Service League" who in order to stimulate food production, sent fertilizer to some 117 farmers who were in the Fall to pay back either cash or produce. The scheme proved successful, and resulted in the increased production of a very considerable amount of potatoes and other farm produce. It is planned to issue a detailed statement of this scheme at a later date.

4. We co-operated with the Halifax Board of Trade who provided a substantial amount of prize money to be awarded to farmers making the best endeavor to increase food production. A detailed report of this will be found in Part 2 of this report. It is sufficient in the meantime to state that the scheme was a good one, showing as it did the interest of the city man in the farmer's problems and giving farmers some real encouragement in their work.

5. As explained under the paragraph on wheat growing the Department was instrumental in providing several thousand bushels of extra seed wheat which otherwise would not have been obtainable. Also a considerable quantity of buckwheat, for which a demand arose on account for the lateness of the year, was procured and distributed.

6. Partly for experimental and demonstration purposes, and partly that farmers might have a chance to see for themselves, the Department secured three light farm tractors which were demonstrated during the month of October at five centres in the province and which were afterwards operated commercially. These tractors were a 9-18 Case, a 10-20 Mogul made by the International-Harvester Company, and the new Ford tractor, the latter being the first of the new Fords, and in fact the only Ford that was demonstrated in Canada this year. The first two were purchased by the Department. The last was presented to the Department by Mr. Ford personally.

The demonstrations proved that tractors can be used on many farms in Nova Scotia. Those who were present were surprised at the ease with which the tractors could be handled and the speed with which, and the limited amount of ground on which they could be turned. In the general judgment of those who witnessed the demonstrations, preference was given to the lighter tractors which seemed to be better adapted than the heavier ones especially on the soft and uneven ground.

Subsequent to the demonstrations, the tractors were let out to contract work, the Case in Kings County, the Mogul in Hants County, and the Ford in Colchester County.

Contracts for ploughing were taken at $2,[illegible] acre. It may be said, however, that in addition to the [illegible]ness of the season, which shortened the working day, the operations of these tractors were much interfered with by the continuous wet weather and latterly by the unusually early frosts. None the less the machines were operated long enough to show that, if sufficiently large contracts were offered on adjoining farms, these tractors could be advantageously used. At the present time our judgment is that their biggest contribution to increased crop production will be in summer and early fall plowing when tractors could be worked continuously irrespective of heat or dust or dryness of the soil.

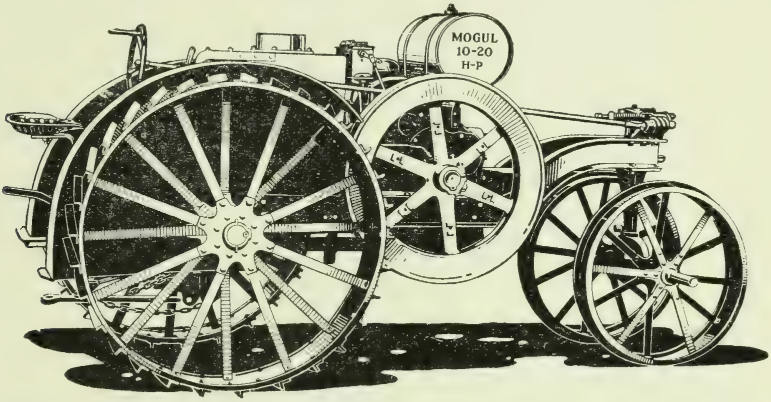
To give some idea of the cost of plowing an acre under favorable conditions and the amount of oil consumed in doing so the following figures are submitted. It is only fair, however, to state that the conditions were not alike and that no special preparation was made, and that in all cases it was very cool weather and the soil was very wet. This latter condition was especially unfavorable to the heavier Mogul machine, which we are sure would have made a much better showing under normal conditions:

MAKE	Acres	Gasolene	Kerosene	Lub. Oil	Hard Oil	Cost per acre of fuel consumed.
Ford..........	7	½ gal	17 gal	½ gal	1 lb.	62c
Case..........	4	½ "	9¾ "	¼ "	½".	63c
Mogul........	4⅛	1 "	13 "	¾ "	½ "	82c

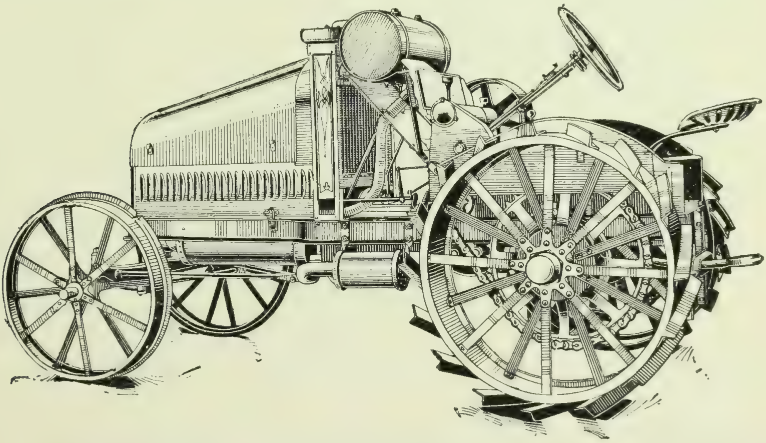
FEDERAL APPROPRIATION TO THE PROVINCE UNDER THE ACRICULTURAL INSTRUCTION ACT.

Under the provisions of the Agricultural Instruction Act of 1913, the Province of Nova Scotia received from the Dominion Government for the year 1916 the sum of $81,716.69. The agreement made with the Federal Government in connection with the expenditure of this grant provided for its expenditure as follows:—

A. J. I. Case Kerosene Tractor, one of which is owned by the N. S. Department of Agriculture.



An International Harvester Mogul Tractor, one of which is owned by the N. S. Department of Agriculture.



The most recent 8-16 type of tractor made by the International Harvestor Co.

(a) Colleges and schools of Agriculture.

Capital, (Science Building, Construction and furnishing Interest and Sinking Fund)	$8,000.00
Salaries and Maintenance	23,000.00

(b) Demonstration and Instruction:—

District Representatives	7,500.00
Short Courses, (Demonstration Buildings, Maintenance, Allowance to students	3,000.00
Dairying	3,500.00
Poultry	1,500.00
Bee-keeping and Apiary Inspection	1,500.00
Drainage. Demonstration and Soil Survey	2,500.00
Soils and Fertilizers, Demonstration	500.00
Field Crops, Demonstration	2,000.00
Fruit Growing	2,000.00
Women's Work, (Institutes and Clubs, Domestic Science Short Courses and Allowances	3,000.00
Entomological Work, (Horticultural and Entomological Investigation, Eradication of Insect Pests	10,000.00

(c) Elementary Agricultural Education.

Agricultural Instruction in Public, High and Normal Schools, Training Teachers, Allowance, Grants	10,000.00	
School Childrens' Exhibits and Competitions	2,000.00	
Contingencies and Miscellaneous	1,716.69	
		$81,716.69

The following balances were carried over from 1916:—

Capital, Interest and Sinking Fund	$ 2,494.27
Salary and Maintenance	131.07
District Representatives	866.51
Short Courses	260.55
Dairying	460.49
Poultry	404.37
Bee-keeping and Apiary Inspection	49.38
Soils and Fertilizer	578.03
Fruit Growing	.18

Womens Work	837.05
Entomological Work	1.34
Elementary Agricultural Education (Rural Science Schools	2,337.99
Contingencies and Miscellaneous	202.47
	$ 8,623.70

The expenditure for the year has been made largely along the same lines as during the previous year. Readers, therefore, who may be interested in the details are referred to pages 14 to 20 in the Annual Report of the Secretary for Agriculture for the year 1916. By way of supplement to this, it is sufficient to state that practically every line of work outlined in 1916 has been further developed in 1917. This work is so closely related to the general provincial work of the Department that the reader may assume that practically half of the cost of carrying on the various lines of work outlined in this report, with the exception of the Agricultural Society and Exhibition work, has been paid for out of this Federal appropriation. Whatever may be said in regard to the benefits derived from the Federal appropriation in the larger provinces of the Dominion, there is no question that a large measure of the progress made in Nova Scotia, and no doubt in others of the smaller provinces during the past few years must be attributed directly to the aid received from this appropriation. In fact were this appropriation discontinued and a corresponding amount of assistance were not forthcoming from the provincial Government, it would be necessary to suspend practically half of the activities of the Department of Agriculture as at present constituted.

Conclusion.

Problems connected with the food production are now entering more largely than ever into the scope of the work of every branch of the Department, and every member is endeavoring so far as possible to make some contribution that will increase the aggregate food production of the Province of Nova Scotia. To further facilitate these measures there was appointed by Order-in-Council in November 1917 "The Development of Agricultural Resources Committee" constituted of members of the Legislature and the Secretary for Agriculture. This body has held several meetings, as a result of which several practical measures have already been adopted which it is hoped will lead to considerable assistance to the farmers of the province in their efforts to increase the production of food in

1918. In due time a special report of this committee will be issued.

The importance of food production at the present crisis in the war cannot be over estimated, and it is accordingly the sincere hope of the undersigned and of every member of the staff of the Department of Agriculture that we may be able to render material assistance to the farmers of Nova Scotia at this crisis in their history. In our efforts to accomplish this, we have already received much help from yourself in your capacity as Premier and Minister of Agriculture, and your colleagues. I wish therefore to conclude this report by expressing the personal appreciation of myself and my colleagues for the advice and assistance which we have received from yourselves at all times.

I have the honor to be, Sir,

Your obedient servant,

M. CUMMING,
Secretary for Agriculture.

THIRTEENTH ANNUAL REPORT OF THE COLLEGE OF AGRICULTURE.

Sir:—

I have the honor to submit the Thirteenth Annual Report of the College of Agriculture, being for the year 1917. The report is divided as follows:—

Part 1—Report of the Principal.
Part 2—Report of the Professor of Agriculture and Farm Superintendent.
Part 3—Report of the Professor of Botany.
Part 4—Report of the Professor of Zoology and Provincial Entomologist.
Part 5—Report of the Professor of Horticulture.
Part 6—Report of the Superintendent of Poultry.
Part 7—Report of the Superintendent of Dairying and Lecturer in Dairying.
Part 8—Report of the Professor of Chemistry.
Part 9—Report of the Superintendent of Womens' Institutes.

PART 1—REPORT OF THE PRINCIPAL.

The number of students now enrolled in the regular course is 63 in comparison with 114 the year before the war broke out. Of the 63 students now enrolled 42 are from Nova Scotia, 14 from New Brunswick, 5 from P. E. Island, 2 from England. There are 28 seniors and 35 juniors. Two returned soldiers are now taking special courses.

Graduates of 1917.

In April, 1917, 12 students were awarded the Associate Diploma of the College. They were:—

Allain Belliveau, St. Joseph, N. B.
Antoine C. Belliveau, St. Joseph, N. B.
John E. Briggs, Wellington, N. S.
Thomas R. Goudge, Sackville, N. S.
Daniel E. McLeod, Scotsburn, N. S.
Stanley H. Morrison, Wolfville, N. S.
Thomas C. Munn, Leitche's Creek, C. B.
Edmond F. Pineau, Charlottetown, P. E. I.
James C. Stewart, Upper Malagash, N. S.
John R. Sutherland, Scotsburn, N. S.
Frederick W. Walsh, Coverdale, N. B.
Robert M. Wood, Carter's Point, N. B.

Mr. Peter P. Collin of St. Hillaire, N. B., and Alfred J. Smith of Glace Bay, N. S. failed to complete a part of the course, but will be awarded diplomas when they regularly complete the course.

Robert M. Wood of Carter's Point, N. B. was awarded the Governor General's medal for the highest standing in the class.

We have made a special effort to secure the names of all the regular college students who have joined the overseas forces. Our list is not yet complete, but we have on our Roll of Honor at the present time 111 names. We will be glad if students enlisting from time to time will make a point of sending us their names together with their military address so that we can keep in touch with them and send them news from the College.

It is with sadness that we have to record that a number of the boys have fallen in defence of the Empire. The names of these, so far,s we have been able to obtain them, are:—

Bunnell, Leonard '09, Killed in action at Ypres 1915.
Campbell, Lieu. H. Wallace '12, Killed in action 1916.
Ells, Glen S. ex '16, Killed in action Oct. 1916.
Landels, Lieu. B. H. '09, Killed in action on the Somme, Sept. 1916.
MacKenzie, F. M. '15, Killed in action, Nov. 1917.
Parker, Norman ex '16, Killed in action, Nov. 1917.
Shipton, J. Cuthbert '12, Died in active service 1916.

The Short Course.

The Short Course for January 1917 was reported in the 1916 report. It was the largest in the history of the College, the total enrolment being 290.

At the date of writing the Short Course for 1918 is in session. Unfortunately a heavy snow storm that stopped the trains for several days prevented a large number who had planned to be present from attending. None the less the enrolled attendance was 165. In addition, there was a local and intermittent attendance of about 75 more. While in comparison with corresponding courses held at other Colleges of Agriculture the attendance for 1918 is large, yet in comparison with previous courses at Truro it is very considerably reduced. No doubt labor conditions as well as the storm were a contributary cause of the reduced number.

Extra Mural Short Courses.

Four short courses were held at local points in the province during the year, viz. at Lawrencetown, Yarmouth Bridgewater and Musquodoboit. The average attendance at all sessions of these courses was considerably over 100, and in every respect they must be regarded as having been extremely successful. Practically all the instruction work was carried on by the regular members of the staff of the College of Agriculture.

Rural Science School.

There were 148 students enrolled at the 1917 summer session of the Rural Science School conducted jointly by the staffs of the Normal College and the College of Agriculture.

The Director of Rural Science, Mr. L. A. DeWolfe, who is a member of the Education Department of the province, has completed a very successful year. He reports 4,176 home gardens in connection with schools, 70 local School Fairs, 60 Schools exhibiting at County Fairs, and 55 Schools exhibiting at the Provincial Exhibition, Halifax.

A full report of the Rural Science School and of the Rural Science work will be found in the report of the Superintendent of Education for the Province.

The Faculty.

One member of the staff, C. B. Gooderham, B. S. A., Assistant Entomologist, resigned during the year to accept the position of Assistant Agriculturist for the Dominion with headquarters at Ottawa. Mr. Gooderham was a painstaking efficient member of the staff whose services have been greatly missed. His position has not yet been filled.

Since the war commenced the staff has been reduced in number owing to the enlistment of a number of its members. In the main the positions vacated by these men have not been filled, their work being shared up among the remaining members of the Staff assisted by men temporarily employed. This condition of affairs naturally has retarded some development of the College work, but in the main the quality of the work done has not suffered. Moreover every member of the staff now doing extra work is only too glad to make this small contribution towards helping to solve the war situation. Those members of the staff who have enlisted since the war commenced are:—

*Lieutenant B. H. Landels, Professor of Agriculture and Superintendent of Drainage Department.
Captain C. A. Good, Assistant Entomologist.
Lieutenant A. E. Humphrey, Assistant in Drainage Department.
Sergt. W. J. Bird, Assistant Dairy Superintendent.
Gunner P. L. Sanford, Assistant Agriculturist.

Instruction for Returned Soldiers.

During the summer plans were entertained for offering a special course for returned soldiers. However, we are advised by the Hospital's Commission that as yet only a comparatively few soldiers have applied for such a course, and consequently the plans are not completed. In the meantime two returned soldiers are now taking special courses of instruction. Should there be more applications for such instruction better provisions will be made, and courses provided that will be better adapted to the needs of these men.

The Future.

The present time does not seem an auspicious one for making suggestions in regard to new buildings. None the less the Tractor demonstrations which were conducted during the past year, as described in a former part of this report, proved the practicibility of using tractors for farm work in many parts of the province, the result of which is a demand for instruction in the operation of tractors. Combined with this should be instruction in the operation of all kinds of engines. To afford accommodation for this instruction it will be necessary to provide a special building fitted with proper apparatus for teaching and demonstrating this important subject. It will also be necessary to secure the services of one or more engine experts. While I would not recommend such an addition at the present time, I herewith urge the need of making provision for carrying on this important work at no very distant date.

In closing I am pleased to convey my thanks to every member of the staff for the readiness with which they have joined to promote the various branches of the work of the College, and can only hope that our joint efforts will result in the further advancement of agriculture in Nova Scotia.

Your obedient servant,

M. CUMMING,
Principal College of Agriculture.

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*Fell at the Somme in September, 1916.

PART 2—REPORT OF THE PROFESSOR OF AGRICULTURE AND FARM SUPERINTENDENT.

Principal Cumming,
Secretary for Agriculture.

Sir:—I herewith submit my fifth annual report as Professor of Agriculture and Farm Superintendent at the Nova Scotia Agricultural College for the year 1917.

During the fall of 1916 and the winter months of this year a large part of my time was spent in giving instruction to the regular classes in the College. This work included lectures and practical work in field crops, soils and fertilizers, judging live stock, herd management, care and management of sheep and swine, feeding live stock, principles of breeding farm live stock, the use and care of all kinds of farm machinery and the arrangement and construction of farm buildings. The equipment of the College for instruction in general agriculture is excellent. The herds of horses, cattle and swine furnish good material for illustrating lectures and for the study and judging of the actual animals. The lectures on feeding and care of animals are supplemented by a continual inspection of the work of feeding stallions, working horses and colts, bulls, cows, heifers and calves, and boars, brood sows and young pigs, thus giving the student practical information as to how animals should be fed and handled.

The farm rotation of crops and the variety of plants grown furnish illustrative material for work in field husbandry. These crops include grasses and clovers for hay, oats, wheat, barley, oats peas and vetches for silage, corn for silage, green crops for late summer and fall feeding, alfalfa, turnips and mangels. In addition seed is grown from turnips, mangels, clover, and alfalfa for use on the college farm. The results obtained from the work with all these crops gives excellent material for class room instruction. The College is well equipped with farm machinery and students have an opportunity of studying its construction and operation. We have lately secured a farm tractor which will be used to give students instruction in operating such a machine and an opportunity to judge of their usefulness to Nova Scotia farmers.

Farm Work.

On the College farm the work of the past year has been carried on in a fairly satisfactory way considering the difficulty in securing competent laborers. During the winter the regular work of caring for live stock, hauling out manure, hauling sawdust for bedding, hauling hay from the marsh, and getting machinery and tools ready for spring work went on as usual. Two teams spent some time in hauling deal from the woods to the railroad for a neighboring lumberman.

The weather during the months of April and May was cold and wet and most of the crops were put in late. A few days of fine weather in the fourth week of April gave us a chance to sow one field of oats at that time, but little farm work was done after that until late in May. Corn was not planted until June 12th. which is two weeks later than usual. Hot weather in July favored its growth, however, and as will be seen in the report for that crop a good yield was secured.

The hay crop was excellent, averaging as much as in any year for some time, excepting one field, giving a yield of approximately 3 tons of fresh cured hay per acre. Root crops gave a fair yield, turnips giving an average of 959 bushels per acre and mangels 641. In 1916 the average yield respectively for the two crops was 913 and 539 bushels. Club root appeared in restricted areas throughout the turnip field, and reduced the yield materially on a few plots. All the results obtained with the different crops will be found fully described in this report under the separate heading for each crop.

Crop Report.

A five year rotation is followed on the College Farm. When sod land is ploughed the next crop is either oats peas and vetches, or corn for silage, and the other crops are grown in the following order on the fifty acres contained in the main, or home farm.

1st year	5 acres	O. P. V. for silage.
and	5 "	Corn "
2nd year	10 "	Roots (turnips and mangels)
3rd "	10 "	Oats, wheat, and barley (seeded for hay)
4th "	10 "	mixed hay, mostly clover.
5th "	10 "	mixed hay, mostly timothy.
6th "	back to silage crops.	

Special crops such as alfalfa, oats, peas and vetches for green feed, rape, soft turnips, etc. are grown on other fields and are not allowed to interfere with the regular rotation on the home farm.

Oats.

As will be seen from the rotation given above oats followed roots. This land was plowed only four inches deep with a 2-gang plow in the spring, was thoroughly harrowed with spike tooth harrow and was not given any fertilizer. The land had been well prepared the year before for roots and did not need any further dressing for oats. In preparation for roots it had received about 20 tons of manure and 1000 lbs. of various phosphoric acid fertilizers per acre. Any additional fertilizer would have been likely to make the oats grow too rank and cause them to lodge.

Seeding for oats began on the 10 acre field No. 4 on April 25th. one day later than oat seeding was begun in 1916.

The following shows date of first seeding and the temperature of the soil three inches deep for the past five years.

Date of first seeding oats.		Soil temperature at depth of 3 inches.
1913	April 20th	52 deg. F.
1914	May 13th	45 “ F.
1915	April 29th	39 “ F.
1917	April 25th	44 “ F.

Date of first seeding wheat.

1915	April 22nd	36 deg. F.
1916	April 28th	42 “ F.
1917	May 28—sowed late on marsh. (Note about weather).	

It will be noted that oat seeding began on April 25th. For several weeks following this date the weather was wet and cold and little seeding could be done. A small piece of oat, peas, and vetch was sown on May 8th, and a plot of oats was sown on May 21st. Corn was not planted until June 12th and turnips on June 14th. Oats were not sowed on the marsh until June 1st and 2nd.

All grain sown this year was treated with formalin to destroy smut spores. The solution was prepared by adding 1 pint of formalin to 30 gallons of water and soaking the bags of grain in this for 15 minutes. This treatment gives complete satisfaction as no smut appeared in the oat field. This treatment will not kill the spores of the "loose smut" of wheat and barley and some of that disease was found on those crops.

The following table shows the varieties of oats sown and yields obtained:—

Variety	Size of Plot	Lbs. of Straw and Grain per Acre.	Yield of Grain per Acre Bushels	Percent of Hull
Banner..........	3½ acres	11910	37.7	
Ligowa..........	2½ "	6860	27.5	
O. A. C. 72.......	1½ "	5978	38.7	
Banner..........	2 "	7150	44.00	
Early Blossom...	1 "	3090	37.5	
Banner..........	7 "	(On marsh)	27.6	

The yield of oats was the lowest this year that has been obtained on the farm for many years. Although the grain seemed to grow well early in the season it did not fill well and heavy rain storms in August caused most of the fields to lodge badly, and at cutting time the grass had grown up through the oats in many places and made harvesting extremely difficult. This condition contributed largely to low yield. It will be noted, however, that the Banner oat holds its place at the head of the list as usual.

The oat field was treated with ground lime stone last year before turnips was sown. Half acre check plots were left between each two acres, thus giving four 2-acre plots and four half-acre plots. On two of the half-acre check plots the oats were harvested separately and gave a lighter yield than the limed plots. A full report of this experiment will be found later in this report under the heading "Ground Limestone."

Less oats were sown on the marsh than usual. The yield was not large but the quality of the grain is excellent.

Wheat.

Three plots of wheat were sown on the marsh, as we had no field on the upland that we could use for that purpose. It was late for sowing wheat before the marsh was dry enough to work and the seed was not sown until May 28th. The yield was very light giving an acreage of 7 bushels per acre. This is another illustration of the fact that it is not wise to sow wheat on land and under conditions not suited for its growth. The wheat plant is not as gross a feeder as the oat and in order to do well must have very much more careful treament.

Barley.

Five pounds of barley received from J. A. Clarke, Dominion Experimental Farm, Charlottetown was sown on May 8th and cut on Sept. 13th. This barley grew well and gave a yield of 92 lbs. of first class grain.

The variety was Charlottetown No. 80 and it has the reputation of loosing its awns to a considerable extent in the field before harvesting. We found that a large part of the awns, or beards, had fallen off before threshing began, and that none remained on the grain after it was threshed. This quality makes the grain much easier to handle than those varieties in which the awns are persistent.

This yield was very good considering that heavy rains caused the whole plot to lodge, and grass and clover grew up through the grain before it was ripe enough to. cut. A small piece of barley was sown on the marsh but did not start well and was cut early for hay.

Seeding for Hay Crop.

Ten acres on field No. 4 where the oats were grown was seeded with 10 lbs. of timothy and 8 lbs. of red clover and 2 lbs. of alsike. This seeding started well and was in excellent condition Nov. 1st. On the marsh less Alsike was sown than has been the custom for several years. We found that a heavy Alsike growth made the grass lodge on account of the weak stems of the Alsike, and also made it extremely hard to cure. This year 7 lbs. of timothy, 5 lbs. of Red Clover and 3 lbs. of Alsike were sown.

Clover for Seed.

One half acre of land that had been left fallow during the early part of the summer and frequently harrowed was seeded with 10 lbs. of Red Clover on August 12th. The land was in good tilth and received a dressing of 400 lbs. of Sydney Slag "A" quality. The seed was treated with a pure culture of the Bacteria which live on the roots of clover and gather nitrogen from the air. It germinated quickly and was in excellent condition on Nov. 1st.

Alfalfa for Seed.

About three quarters of an acre of land was treated in the same way as the clover piece described above, and seeded with 20 lbs. of Ontario Variegated Alfalfa seed on August

12th. This piece of land had been in Alfalfa since the summer of 1914. In my report for 1916, I stated that native grasses had been crowding out the Alfalfa and that the plot would soon have to be plowed up. This was done in the spring of this year and it was left fallow with frequent harrowings until August 12th. The seed used was grown in Ontario and just before sowing was treated with a culture of the bacteria that live on the roots of Alfalfa and gather nitrogen. The cultures used for this purpose are furnished by the Secretary for Agriculture to any person who applies for them. Enough material is furnished for 25 cents to treat 25 to 30 lbs. of seed. In many cases the clover bacteria are already abundant in the soil and no treatment is necessary. In the case of alfalfa, however, it generally pays well to inoculate the seed, as a much stronger growth is the result. Where inoculation has not been used the plants will often turn yellow and soon die, whereas the treated seed will grow vigorous dark green colored plants that develop rapidly.

The plot where we sowed the Alfalfa this year was seeded to the same crop in July 1914. A reference to my report for the past three years will show what has been obtained, Briefly I may say that a fairly good crop was secured in 1915, the first cutting on July 7th. giving 2 tons of hay per acre and a second cutting on Sept. 2nd, giving 1 ton. In 1916 about the same yield was obtained but Alfalfa was badly mixed with weeds and grasses. These native grasses seem to survive wet weather and wet springs with frequent freezing better than the Alfalfa. We have made our new seeding on the same ground in order to take advantage of the growth of the nitrogen gathering bacteria on the plot for the past three years.

Sydney Basic Slag, "A" quality, was used at the rate of 800 lbs. per acre. The seed germinated well and the plants looked vigorous on Nov. 1st., the ground being covered with a thick even mat of plants. It will be interesting to note how the second seeding of Alfalfa on this plot compares with the results obtained from the first seeding.

In addition to the work with Alfalfa described above, we have selected seed from a few plants obtained from Professor N. E. Hansen of South Dakato. Professor Hansen has made a number of trips to Northern Europe to secure plants and seeds for the United States Government. He obtained Alfalfa plants from Northern Siberia that have done well in South Dakota. We were fortunate enough to secure a few plants from Professor Hansen. These plants have produced seed and some of the seed was sown last summer. It germinated strongly and the plants grew well. Their ability to stand the winter will be reported on next year.

Mangels.

Mangels were grown on two and a half acres on field No. 5 where corn was grown last year. This land received a light dressing of manure the winter of 1916 to prepare it for corn, it received another dressing of about 20 tons per acre the spring of 1917 to prepare it for mangels. The seed was put in later than is thought best for securing large yield, but the weather did not permit of earlier seeding. The following table shows the fertilizer used and the yields obtained. Two varieties of mangels were sown, but the rows were alternated in such a way that variety had no effect upon the fertilizer experiments:—

The two varieties grown were the Royal Giant Sugar Beet, which gave 628 bushels per acre, and the Giant Yellow Oval which gave 653 bushels.

The following table shows the returns by plots and the fertilizers used:

Plot No.	Area in acres.	Fertilizer lbs. per acre.	Yield in bus. per Acre 50 lbs. per bus.
No. 1.	two fifths	1000 lbs. Acid Phosphate	705
check	one fifth	no fertilizer	560
No. 2	two fifths	1000 lbs. "A" quality Slag	596
check	one fifth	no fertilizer	560
No. 3	Two fifths	1000 lbs. ground rock phosphate	541
check	One fifth	no fertilizer	656
No. 4	Two fifths	1000 lbs. war slag	754
check	One tenth	no fertilizer	656
No. 5	One fifth	1000 lbs. war slag	850
check	no fertilizer		764

The largest gain was obtained on Plot 1 from the use of Acid Phosphate, 145 bus. per acre. The returns from the plot treated with ground rock phosphate were 115 bushels less than on the check plot. I cannot explain why this result was obtained, as it does not seem possible that the ground rock phosphate would interfere in any way with the growth of the mangels. The returns from the "A" quality Sydney slag were only small being 36 bushels per acre while the returns from the lower grade war slag were considerably larger. This would indicate that there must have been considerable variation in the quality of the soil, and that it would be useless to base any conclusions on the above result.

Turnips.

Turnips were planted on the remainder of field No. 5 where corn and O. P. V. had been grown the year before. On the 5 acres where O. P. V. was grown in 1916 couch grass got a good start and as soon as the O. P. V. was cut in August the land was plowed as shallow as possible and the couch roots turned up to the hot sun. The land was frequently harrowed through August and September with the spike tooth and chain harrow and the couch roots constantly pulled to the surface. A good many cart loads of the dried root-stalks were hauled off and as a result of this work the couch gave little trouble in the turnips this summer. It was plowed deeply late in the fall and left rough throughout the winter. The whole turnip field was given a dressing of about 20 loads of manure per acre during the winter and spring and was cross plowed as shallow as possible in May. It was thoroughly harrowed and worked up deeply with the stiff-foot cultivator and was in good condition for seeding on June 14th. The whole field was seeded from that date to the 19th. at the rate of two and a half pounds of seed per acre. The following table shows the fertilizer used and the yields obtained.

	Fertilizer used	Yield per acre.
Plot No. 1	1000 lbs. Acid Phosphate	786
check	no fertilizer	839
Plot No. 2	1000 lbs. "A" Slag	905
check	no fertilizer	829
Plot No. 3	1000 lbs. "A." Slag	935
check	no fertilizer	869
Plot No. 4	1000 lbs. Ground Rock Phos.	988
check	no fertilizer	793
Plot No. 5	1000 lbs. War Slag	1088
check	no fertilizer	1034
Plot No. 6	1000 lbs. Acid Phosphate	966
check	no fertilizer	1024
Plot No. 7	1000 lbs. Acid Phosphate	977
check	no fertilizer	1018
Plot No. 8	1000 lbs. "A" Slag	1004
check	no fertilizer	1022
Plot No. 9	1000 lbs. Rock Phosphate	1045
check	no fertilizer	1104
Plot No. 10	1000 lbs. War Slag	1058
check	no fertilizer	1066
Plot No. 11	1000 lbs. War Slag	950
check	no fertilizer	1088
Plot No. 12	1000 lbs. ground Rock Phos.	801
check	no fertilizer	868

The first six plots were seeded with the variety called "Sutton's Magnum Bonum" and the last six with Sutton's Champion. It will be noted at once that there was some apparent gain from the use of fertilizers in plots 2, 3, 4 and 5, while in plots 6-12 inclusive there is an apparent loss. Plot No. 1 cannot be compared with the others as there was considerable loss on the fertilized part of the plot from the effects of club-root. If we look over the figures for plots

2-5 inclusive we find that the check plots all show a yield of less than 900 bushels per acre, and here we find that the addition of the phosphoric acid seems to have given some increase, especially in the form of ground rock phosphate where the gain is almost 200 bushels per acre. It would seem from these figures that this part of the field was not so rich as the plots 6 to 12 and that therefore the use of the fertilizer gave some returns. On the remainder of the field, however, the check plots all show a yield of over 1000 bushels per acre, and here the use of the phosphoric acid seems to have retarded rather than to have improved the growth. This action is only slight on most of the plots and it is probably only by chance that the fertilized plots show less than the unfertilized. We have never seen or heard of 1000 lbs. of the fertilizers used affecting the crop disadvantageously. In growing turnips by the acre any practical grower will realize that a difference of 50 bushels per acre does not mean anything as between one fertilizer or another. A slight difference in the quality of the soil, or even the difference between a good hoer and a poor one at thinning time will more than account for the variation in yield.

It is evident from these results that this field did not need a phosphoric acid fertilizer. In earlier years, before so much barnyard manure had been used on the farm excellent results were obtained from the use of phosphoric acid. At the present time we evidently do not need to use much commercial fertilizer, and we have come to the conclusion that next year the large plots will not need to receive any, and only a few rows will need to be treated as checks on the main field.

No turnip seed was secured this year as practically all turnips saved from the 1916 crop for seed rotted in the cellar or in the rows after planting. This year, under the direction of the Seed Branch at Ottawa we planted an acre of turnip seed in August. The land used was in grass this year and was mowed for hay on July 20th. The land was immediately plowed fitted for turnips and seeded on July 26th. The plants came on quickly, were harvested Nov. 15th and were from 1 to 3 inches in diameter. We hope these small turnips will keep better in the cellar than the larger ones we have stored heretofore.

Silage Crops.

Oats, peas and vetches were grown on five acres on field No. 1. The sod land was plowed in the fall and lightly manured during the winter and spring. The seed mixture made up of 2½ bushels of oats, ½ bushel of peas and ⅓ bushel of vetch was sown with the grain drill on May 3rd. The crop was cut and put in the silo on August 11 to 13, and a little over 50 tons was harvested from the 5 acres. This material was cut when the oats were still in the milk stage, just beginning to thicken up for the dough stage. Practically all the straw was green. If cut too ripe it will not settle solidly enough in the silo to exclude the air and as a result it will mold. We have fed this O. P. V. Silage now for three years and find that the cows eat it well.

Corn was planted on the other half of field No. 1. The sod was not plowed until June 8th and 9th. It was rolled as soon as plowed, then harrowed and fitted for the corn as quickly as possible and planted on the 12th. The sod had been given a dressing of about 20 loads of manure per acre in the early spring and the grass was quite high when it was plowed under. This grass and manure furnished food for corn later in the season.

The following table shows the varieties used and the yields obtained in both 1916 and 1917.

Variety	Yield per acre.	
	1916	1917
White Cap Yellow Dent....	22890	21370
Longfellow................	24110	23580
Wisconsin No. 7...........	22300	21400
Comptons Early............	20201	21365
Golden Glow...............	21200	25095
Average yield per acre.....	11 tons 110 lbs.	11 tons 562 lbs

The yield for the five acres is almost exactly the same for both years. In 1916 Longfellow had first place with 24,110 lbs. while this year Golden Glow comes first with 25095 lbs., while Longfellow comes second with 23580. The corn was planted later than usual on account of the cold late spring. We prefer to get it in by the last week in May. The hot weather in July brought it along at a rapid rate, however, and gave us a better crop than usual.

(For experiment in corn field, see below under heading "Best Method of Spreading Barnyard Manure.")

The silage made from the O. P. V. and from the corn was analyzed by Professor Harlow of the Chemistry Department, and it was found to have the following composition:—

	Corn Silage %	O. P. V. Silage %	O. P. V. *Silage %
Water	84.12	77.5	73.85
Protein	1.68	2.87	2.75
Fat	.56	.62	1.42
Ash Soluble	.96	1.43	1.48
insoluble	.24	.34	.44
Carbohydrates	12.47	19.24	20.06
Acidity	.....	.22	1.75

These analyses agree well with those made in other years, and show that the O. P. V. silage contains 7 to 10% more dry matter than the corn, and that the protein is about 1% and the carbohydrates from 7 to 8% higher. Its higher feed value coupled with the small amount of labor required to grow it as compared with corn, makes this O. P. V. mixture a valuable one for Nova Scotia farmers.

Hay.

Haying began on July 20th about one week later than usual on this farm. The weather was showery for some time and it was slow work getting the hay cured. The yield was good, altho not as heavy on one field on the upland as the year before. On the marsh the crop was excellent averaging about 3 tons per acre.

Fertilizers.

Only phosphoric acid fertilizers were used this year. The report of their value will be found under the description of the experiments with mangels and turnips. As pointed out under those headings it is evident that the soil on the College farm is receiving enough plant food in barn yard manure, and from the growth of clovers and the frequent plowing down of stubble and aftermath to supply the crops with all they need. We therefore plan next year to use only very small amounts of commercial fertilizers and that mostly on check plots. The use of slag on the marsh when growing oats and seeding to grass and clover continues to give excellent results. We have used 500 lbs. of "A" Slag per acre and have obtained a fine stand of clover and a heavy crop the second year.

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*Sample from H. A. Higgins, Fort Lawrence, N. S.

Pastures.

We have continued the practice of using a few tons of slag each year on part of our permanent pastures. We find that the grasses and clover are markedly more luxuriant where this dressing has been used. Last year three tons were used on the Marple pasture at the rate of from 400 to 500 lbs. per acre.

This farm is something less than 100 acres in extent, about half of which is cleared land, the remainder being rather thick woods without much pasturage. This pasture during the past summer carried 22 head of cattle and 5 head of horses from June 1st. to October 15th. In addition to this it carried 7 other cattle from June 1st. to August 21st. and 3 mares with sucking colts for 2 months.

The 29 cattle gained	2160	lbs.
" 5 young horses gained	520	"
" 3 colts gained	450	"
Total	3130	"

The cost of this pasture to the College for the season was as follows:—The farm cost $2500.00, about half of it is in woodland and half in pasture. The wood-lot will furnish enough posts, rails, logs, etc. per year to pay the interest or at least $1000.00 leaving the interest on $1500 to be paid by the pasture.

$1500 at 6%	$ 90.00
200 for fencing at 6%	12.00
3 tons of slag at $17.00	51.00
	$153.00

For the sum of $153.00 we therefore were able to secure gains on our live stock amounting to 3130 lbs. or at a cost of slightly less than 5 cts. per pound.

This shows clearly the economy of gains made on pasture. Similar gains could not be made in the barn on dry feed for less than from 10 to 15 cents per pound at ordinary prices for feed and in these times of extremely high prices it would cost much more. We are fully convinced that the Nova Scotia farmer does not pay enough attention to the improvement of his pastures. A few dollars spent every year in "feeding" the pasture will be amply returned in extra feed for the cattle. Young cattle and colts that have good pasture throughout the whole summer will grow repidly and come into the barn in the fall in a condition that will

To the right, limed the year before; to the left, unlimed. The stakes indicate comparative growth of oat plants in each plot.

Rev. J. E. Robitaille of West Arichat who devotes part of his time to the work of Agricultural Demonstrations for the Department of Agriculture in Isle Madame, Richmond County. N. S. He has been very successful in this work.

enable the farmer to winter them at much less cost than when they come in thin, and at the same time they will be better developed.

We have been able to improve our pastures a great deal by the use of wood ashes. Whenever this valuable fertilizer is applied the white clover comes in rapidly and furnishes a greatly increased amount of pasturage.

In order to get more data on method of improving pastures we tried an experiment last spring in a small way on an old mossy pasture. On one piece we sowed Sydney Slag at the rate of 500 lbs. per acre, on a second piece we sowed slag at the same rate and also a mixture of seed made up as follows:—

Timothy	4	lbs.
Canadian Blue Grass	2	"
Red Top	2	"
White Clover	2	"
Red Clover	2	"

A third piece was harrowed with a spike tooth harrow until a good deal of moss was torn loose and fine soil could be seen more or less plainly all over the piece. It was then treated with slag the same as the others and also with the above mixture of seed and harrowed again several times. This was done on June 7th, rather late in the season, but the land was too wet to hold up a horse until June. The only plot upon which results could be seen last year was the one that was harrowed. In the late summer this piece appeared much greener than any other part of the field, so much so that it could be seen across the valley at more than a mile distance. Upon close examination this plot was found to be thickly filled with clover plants and fine grasses. Continued observations will be made of this work the spring and summer of 1918.

Use of Ground Lmestone.

We are continuing the use of ground limestone on the main farm. This year it was applied to field No. 5 where turnips were grown. The field was divided into four 2-acre strips and four half-acre strips. Each two acres was treated with the limestone, and each half acre left without. We thus have the same arrangement in field No. 5 as was reported last year for field No. 4. The 2-acre and half acre strips are alternating thus giving us a good chance to note the effect of the lime treatment on the whole field. No results were to be seen on the turnip field this year, either in yield or effect upon club root.

This agrees with results obtained in other experiments as it has been found that the lime must be applied at least two years before turnips are grown in order to give the best results. Limestone has given good results in checking club-root where it has been in the soil long enough to become soluble and to have a chance to change the soil reaction. We hope that the full effects of this application will be plainly apparent when we put turnips on this field again 5 years later.

The lime applied to Field No. 4 in 1916 altho it showed little effect on the turnip crop that year showed plainly in the oat field this year. In the 3½ acres of Banner oats, reported in the table above showing yield of oats, as giving 37 bushels per acre there was a half acre strip that was not limed in 1916. This strip showed a very much lighter yield than the limed portions on each side of it. Two other strips where lime was not used in the same field also showed reduced yields.

The following figures show the extent to which liming increased the yield:—

Ligowa on limed plot, yield	per acre	29	bus.
" " unlimed " "	" "	21.6	"
O. A. C. 72 on limed plot	" "	40	"
O. A. C. 72 on unlimed "	" "	35	"

These plots will be in hay next year and the difference in yield on the limed and unlimed plots will be noted.

On field No. 1 where the effect of lime on clover growth was reported in 1915 and 1916 no effect was seen in the growth of the O. P. V. silage this year. This field of 10 acres has been treated this fall with ground limestone in order to get it ready for roots next year. The same arrangement of treated and untreated plots has been made as in the case of fields No. 4 and 5. That is, two acres were limed and a check plot of half an acre left unlimed, thus giving 4 half acre plots unlimed alternating across the field.

Method of Spreading Barnyard Manure.

In order to gain some additional date as to whether or not it is wise to spread manure on frozen ground covered with snow, an acre of the corn field was divided into halves and one half covered while in the above condition in February and the other half left until spring. In order to give each piece the same amount and kind of manure one load was spread on the piece selected to be covered in the winter and the next load was placed in a pile on the other half acre.

This was continued until 10 loads had been spread and 10 loads put in the pile. After the pile of manure had thawed out in May and the ground had also thawed the manure in the pile was spread.

The corn when cut showed rather the heaviest yield from the half acre on which the manure was spread in the winter. This was fairly level land with no chance for any great amount of washing to take place. The yield obtained was as follows:—Golden Glow Corn cut green for silage.

Manure spread in winter gave 13,492 lbs of green corn.
" " " spring " 11,603 " " " "
Gain from winter spreading 1889 lbs.

It would appear that there was considerable gain from winter spreading in this case. At any rate it is safe to say that spreading on the frozen ground did not cause any loss in the fertility contained in the manure. The soil on the two halves was of equal fertility as far as could be determined, and they had both received the same treatment for the past five years at least.

Live Stock.

The live stock on the farm at the present time Nov. 1st. 1917, consists of 31 horses (not including team belonging to Horticultural Department) 90 cattle, and 18 swine.

Horses.

The same Clydesdale stallions were used this year as in 1916, namely Lord Ullin and Royal Thomas. The horse business seems to have been very quiet for some time past and the number of mares bred was not large.

The Standard Bred Stallion "Achille" was sold last spring and "Captain Aubrey" bought in his place. Captain Aubrey has a race record of 2.07¼ and is a son of Peter the Great. The following pedigree shows that he is exceptionally well bred:—

CAPTAIN AUBREY—1274—4 **8050 Race Record 2:07¼.**	**Peter the Great** 28955, 2:07½ Sire of 60 in 2:10, and 14 in the 2.05 list incl. **Miss Harris M.** (4) 2:00, **Peter Stevens** 2:01¼; **Peter Volo** (4) 20:2, **Peter Look** (3) 2:03, **Margaret Druien,** 2.03½, **Peter Mac** 2:03½, **Mabel Trask** 2:02½, **Volga** (3) 2:03½, **Peter June** (2) 2.07¼.	**Pilot Medium** 1597.......... Sire of 5 in 2:10 and the dams of 6 in 2:10, etc.	**Happy Medium, 400.** Sire of **Nancy Hanks,** 2:04, etc.
			Tackey 2:26, (dam of 3). by **Pilot Jr.,** 12.
		Santos..................... Dam of **Peter the Great** (4) 2:07½, **J. Malcolm Forbes** (4) 2:08, etc.	**Grand Sentinel** 865, 2:27½. Sire of 22; dams of 40.
			Shadow (dam of 3). By **Young Octoroon.**
	The May Fern 2:11½, dam of **Capt. Aubrey,** 2:07½ (sire) **Lord Revelstoke,** 3, 2:12½ sire **Fern Go,** 2:15½, and grand dam of **Straight Sail,** 2:08½.	**Red Fern** 13393, 227½. Sire of 19 in 2:30. Dams of 7 in 2:20.	**Hambletonian** 1644, 2:26½. Sire of 28 in 2:30. Dams of **Fair Margaret,** 2:07½ and 29 others.
			Fernvale, by **Enfield** 128, dam of **McFern** 2:20, **Red Fern** 2:27½.
		Slip........................ dam of **The May Fern,** 2:11½, **Fern Slip,** 2:25½, **Willie Elkin,** 2.27½.	**Gen. Geo. H. Thomas,** 530 Sire of 6 in 2:30. Dams of **Billy Andrews,** 2:06½ and 13 others.
			Lilly, by **Mars,** 2775. Grand-dam of 3.

Hambletonian 1644, :226½, was sired by Harold 463, sire of **Maud S.** 2:08½.

Captain Aubrey, 2:07¼, although he had but practically one year in the stud before coming to the Maritime Provinces, is the leading speed siring son of Peter the Great, the leading harness sire of the world. He is a handsome bay in color, standing 15.3 hands high and weighing 1200 lbs. He is a stoutly built horse of beautiful conformation with superb set of legs and feet. The well known trainer and driver A. Thomas who gave him his record of 2.07¼ states that if it had not been for an accident in the second heat of the race at Indianapolis in which he took his record, he

A snapshot of Captain Aubrey 2.07¼ by Peter the Great 2.07¼. Captain Aubrey is now owned at the College Farm. (see text.)

The wonderful College Bred Ayrshire "McGregor's Laurie May that, calving as a two year old, produced 13,060 lbs. of milk and 638 lbs. of butter in a year, freshening again in 14 months. (Official record) would have taken a mark of 2.04 as in that heat he went to the half in 1.00¾.

Peter the Great 2.07¼.

Peter the Great, 2.07¼, the sire of Captain Aubrey, is the emperor of trotting stallions. Among his progeny are the trotters Peter Volo 2.02 at 4 years; Mabel Trask 2:02½; Margaret Druien, 2:03¾; Volga 2:04½ at three years; Grace 2:04¾; Peter Scott 2:05 and over 200 others in the standard list of 2:30 performers. Peter the Great is the only stallion that won the Kentucky Futurity and sired winners of this greatest trotting classic.

The May Fern 2:11½.

Captain Aubrey's dam, The May Fern, 2:11½ was not only a fast trotter herself but was a great show mare. She is now gaining an enviable reputation as a producer of speed. She is in addition to Captain Aubrey the dam of Lord Revelstoke 3, 2:13¾ a crack colt trotter and leading sire of Austria, also Fern Go, 2:15¼, a consistent winner in the East in 1915, and is a granddam of Straight Sail 2:08¼ (1915 record.).

Captain Aubrey bred 64 mares during the season and proved to be a very sure sire.

The following is a list of the horses on the farm Nov. 1st. 1917:—

Standard Bred Stallion—Captain Aubrey.
Clydesdale Stallions—Lord Ullin, Royal Thomas and College Baron.
Hackney Stallion—Cliffe Rosador.
Standard Bred Mare—Lillian Allerton.
Clydesdale Mares—Prima Donna, College Belle, Miss Time, Eunice Flash, Rose of Alton, Rosalind Royal, College Jean; a two year old from Barbara by Lord Ullin, and a yearling from Eunice Flash by Lord Ullin.
Clydesdale Colts—Three; one from Prima Dona by Royal Thomas, one from Rosaline Royal by Lord Ullin, and one from Eunice Flash by Lord Ullin.
Hackney Mare—Queen Louise.
" Gelding—Rosador Performer.
One two year old gelding by Cliffe Rosador out of a cross-bred mare, and one weanling of the same breeding.
Eight grade working horses.

One pure bred Clydesdale colt from Rose of Alton was born weak and died in a few days. Another very nice filly-foal from College Belle died when three months old from an injury received in a box stall. The filly was left in a high smooth-walled box stall while the mare was taken out for a short time. She rushed around the stall trying to follow the mare and in jumping up against the high wall she fell back and injured herself internally. In spite of the best efforts of a competent Veterinarian she died in a few days.

Cattle.

The College herd of cattle is made up of Holsteins, Ayrshires, and Shorthorns. They are still kept in two separate barns, the non-reactors in the main barn near the College and the reactors in the barn on the McKenzie Farm. During the year two reactors were slaughtered and their carcasses buried. Two calves that had been dropped by reacting cows responded to the test when one year old. They were slaughtered and upon examination a single nodule was found in the intestines of one, and nothing tubercular in the other. Three cows that had previously passed the test gave a reaction during the year and were moved to the quarantine barn. It is impossible to explain how it was that these animals reacted. All competent authorities admit that in a small percentage of cases the tubercular test will show a reaction when no tuberculosis can be found. This may possibly account for these cases. Eighteen non-reacting females and 14 bulls were sold during the year. A few females no longer useful for breeding purposes were sold for beef. The remainder were sold at public auction on Oct. 18th. Two mature Ayrshire cows and 5 heifers were sold at auction for an average price of $117.14. and one Holstein cow and 4 heifers brought an average price of $137.00. One yearling Holstein bull and 1 yearling Shorthorn were sold at the same time.

These cattle were sold at auction in order to give anyone in the province an opportunity to bid on them if they so desired. The sale was open only to residents of Nova Scotia. The female cattle sold were not claimed to be the best on the farm, as our aim in selling cows and heifers is to part with the merely good and keep only the "top-notchers" for breeding purposes. Only in this way can we always have the best blood obtainable in the young bulls that we sell. The selling of females is only incidental to building up a great breeding herd; the selling of bulls to improve the cows of the whole province is the most important work we can do

A great trio of two year old Ayrshire heifers at the College Farm, which averaged over 45 lbs. of milk per day when fresh. What will they do as matured cows?

The three year old College bred Ayrshire Heifer. Gardrum White Floss. Produced in one day during first lactation period 50.4 lbs. of milk, and in 3 months 3,960 lbs.

with our herd. In connection with the auction held in October it is only fair to say however, that every animal sold was in good condition and many of them were very promising individuals, and all were sired by great bulls.

The following is a brief description of the cattle on the the farm the 1st of November 1917.

Total number 91, non-reactors 76, reactors 15. For production of milk during the year see the table on page 43 for all the cows.

Holsteins—Number 36.

No Holsteins were bought during the year but one cow was slaughtered, one was sold for beef, and 2 cows and 4 heifers were sold for breeders. Six young bulls were sold to Agricultural Societies and to private breeders.

Colony Canary Rag Apple is still at the head of the herd. He is in vigorous condition and his calves are showing up well. The present herd consists of 14 cows, 11 heifers, 2 heifer calves and 8 young bulls, and the stock bull mentioned above.

Ayrshires—Number 38.

No Ayrshires were bought during the year but two cows were sold for beef, and 2 cows and 6 heifers were sold for breeders. Five yearling bulls were sold during the year.

We still have a half interest in the great Ayrshire bull Jean Armours Lotus Laddie. He has developed well during the past year and is now a handsome, vigorous two year old. Gardrum Jim the mature Ayrshire bull we have owned for a number of years is now six years old. He is in splendid condition, and as vigorous as ever. His dam Gardrum Bonnie Jean has just finished a year's test in which she gave over 15000 lbs. of milk containing 622.60 lbs. of fat, equal to 778.32 lbs. butter, 80% fat.

The present Ayrshire herd consists of the two bulls just described, 14 cows, 8 heifers, 7 heifer calves and 7 young bulls.

Shorthorns.

Golden Ben the bull reported at the head of the herd the past two years is still our stock bull. He has developed into a thick heavy well fleshed individual of good style and vigor. His calves are showing excellent form and quality.

No Shorthorn females were bought or sold during the year. Two reactors were slaughtered, one being buried and the other a yearling bull passed for beef. One three year old heifer Rosalind Braemar died at calving time on account of extremely difficult parturition caused by wrong presentation of the foetus.

Three young bulls were sold for breeding stock.

The present herd consists of the stock bull Golden Ben, 7 cows, 2 heifers, 2 heifer calves, 3 young bulls and 2 bull-calves.

Milk Production.

The following table shows the work done by the cows during the year:—

Name	Breed	Age	Days in Milk	Best Year's Record			Date of last Freshening	Sex of calf	Lbs. Milk from freshening to Nov. 1-17.	Remarks
				Lbs. milk	Lbs. butter	% fat				
Maple Grove Louise DeKol	Holstein	16	291	11,226.5	522.21	3.72	June 3-17	Female	4,679.1	....
Victoria Calamity Clay	"	12	365	22,835.0	803.41	2.81	Mar. 20-17	Male	12,343.7	....
Jemima Wayne Sarcastic	"	12	365	14,336.4	560.44	3.13	May 10-17	Female	10,160.2	....
Artis Rosie	"	10	350	16,318.0	751.25	3.78	Oct. 2-16	Male	16,140.9	....
Emma of Evergreen 2nd	"	9	365	16,737.6	654.03	3.13	Oct. 18-16	Female	14,712.1	....
College Flora	"	9	341	10,587.5	416.92	3.14	Aug. 1-17	Male	4,608.7	....
Cobequid Rooker La Honda	"	9	365	13,713.6	613.74	3.58	Oct. 29-16	Male	14,037.2	....
Mechthilde De Pride	"	7	365	12,082.3	498.30	3.29	Jan. 3-17	Male	15,373.7	....
Victoria Pauline Clay	"	7	365	11,568.2	548.90	3.79	Mar. 22-17	Female	9,760.4	....
Miss Mina Rooker	"	6	293	10,034.8	396.71	3.16	Dec. 17-16	Male	9,580.9	....
Flora Rooker Posch	"	6	365	15,599.0	619.69	3.18	Oct. 16-16	Male	15,926.0	....
Ida Rooker 4th	"	6	365	11,599.7	515.34	3.56	Feb. 22-17	Female	9,583.8	....
Flora Wayne Posch	"	3	286	9,064.3	436.35	3.85	Dec. 18-16	Male	9,064.3	....
College Flora Wayne	"	3	365	13,850.1	519.71	3.02	Sept. 11-16	Male	13,850.1	First Calf.
College Canary Rosie	"	3	365	15,496.4	632.70	3.27	Nov. 14-16	Male	15,193.6	First Calf.
Gardrum Brandy 2nd	Ayrshire	10	322	8,207.0	384.83	3.75	Jan. 26-17	Male	3,444.1	....
Scottie's White Floss	"	10	321	12,529.6	618.56	3.94	Dec. 16-16	Male	11,101.2	....
White Bessie	"	9	365	10,634.7	510.40	3.84	June 1-17	Female	6,314.3	Calf Died
Craig 2nd of St. Anne's	"	8	287	8,526.5	449.96	4.20	Aug. 25-17	Female	2,978.5	....
Gardrum Bonnie Jean	"	8	365	15,514.7	778.32	4.02	Aug. 7-16	Male	15,514.7	....
Miss Doris	"	7	317	9,550.1	467.54	3.97	Apr. 22-17	Female	6,944.5	....
East Court Merrymaid	"	6	317	9,771.0	474.38	4.16	Jan. 4-17	Twins	12,088.8	Male and Female
Princess Laurie	"	6	320	10,026.0	481.25	3.84	Dec. 6-16	Female	9,826.0	....
Princess Beatrice	"	6	365	8,761.4	398.87	3.60	June 23-17	Female	5,472.0	....
Miss Craig of Truro	"	4	296	8,936.5	531.69	4.76	Dec. 7-16	Male	8,936.5	....
Harelaw Cherry 5th	"	3	346	7,185.5	373.24	4.18	Mar. 4-17	Male	6,058.9	....
Gardrum Annie Laurie	"	3	305	9,345.7	419.71	3.59	Dec. 27-16	Female	8,327.6	....
MacGregor's Laurie May	"	3	346	13,060.2	638.41	3.91	Sept. 7-16	Male	13,060.2	First Calf
Gardrum Merry Maid	"	3	312	6,846.3	308.75	3.61	Dec. 24-16	Female	6,846.3	First Calf
Gardrum Cherry	"	3	261	6,197.4	293.74	3.79	Feb. 11-17	Female	6,197.4	First Calf
College Evangeline 14th	Shorthorn	5	245	4,811.2	240.57	4.00	Sept. 1-16	Male	2,895.6	....
College Evangeline 15th	"	5	147	2,433.9	110.34	3.23	Sept. 30-17	Male	932.4	....
Pine Grove Boyne Lady	"	4	.....	....	......	....	Dec. 25-16	Male	1,677.4	Suckled Calf 2 mo.
Golden Beauty	"	11	.....	....	......	....	Sept. 2-16	Male	....	Suckled Calf
Braemar Golden Beauty	"	4	.....	....	......	....	Feb. 9-17	Female	....	Suckled Calf
Isobel Ruth Gloster	"	3	.....	....	......	....	Jan. 2-17	Female	....	Suckled Calf
College Boyne Lady	"	3	.....	....	......	....	May 16-17	Male	....	Suckled Calf

It is worth while calling attention to a few of these records. Two Holstein heifers and one Ayrshire have done exceptionally well. College Canary Rosie, a daughter of Artis Rosie, calved when 2 years and 10 months old, on Nov. 14th, 1916. In the next twelve months she gave 15,496 lbs. of milk. Only one 2-year old in the herd has ever beaten that record, and that was Flora Rooker Posch a daughter of Flora Wayne of Riverside. She gave 15,599 lbs. in one year after calving at 2 years and 8 months old. Another heifer to do well last year was College Flora Wayne a daughter of College Flora and grand daughter of Flora Wayne of Riverside. She gave 13,850 lbs. of milk after calving on Sept. 11th, 1916 at 2 years and 6 months old. The dam of this heifer, College Flora, never gave as much milk as her dam Flora Wayne of Riverside. The old Flora Wayne Cow gave 18000 lbs. in one year and has not yet been beaten by any of her descendants. This young granddaughter has made a good start however and may be able to surpass the old cow some day.

The Ayrshire heifer McGregor's Laurie May calved when she was 2 years and 9 months old and gave in less than one year 13,060 lbs. of milk containing 510 lbs. of butter fat equal to 638 lbs. of butter. This is a wonderful record for a 2-yaer old heifer and as far as I know has not been surpassed by but one Ayrshire heifer of her age in Canada. Her record is enhanced in value by the fact that she calved again in less than 14 months from the date of her first calving, and gave birth to twins; fully developed, handsome bull calves. Her breeding is interesting from the fact that her ancestors on both sides have been owned at the College for four generations. Her sire was McGregor Lad by Wee McGregor by McQuittison Secretary. Wee McGregor, a great bull, was out of Annie Laurie of Norwich a College cow well known for her dairy qualities, He sired a number of excellent cows, among them being our great cow, Eastcourt Merry Maid. The dam of McGregor's, Laurie May was Princess May out of Gardrum Brandy 2nd by Grassmillees Red Prince, and this bull was sired by Gardrum Prince afterwards imported to Canada by Retson Bros., and owned for some years by this College. He was the sire of our great Cow Gardrum Bonnie Jean, and of a number of promising heifers now in our herd.

Eastcourt Merrymaid had a record of 9,771 lbs. of milk but during the past year she has given 12,008 lbs. in less than 10 months (Jan. 4th to Nov. 1st) thus increasing her record by over 2000 lbs. The Holstein cow Mechthilde De Pride has also increased her record in the same time (Jan. 3rd to Nov. 1st) from 12,082 to 15, 373 an increase of over 3000 lbs., and she is due to calve again in just 12 months from date of last calving. Other cows have done well during the year making the average production the highest we have ever had.

It has cost more to feed cows during the past year than ever before. We have never known such high prices for feed and labor. In my report for 1916 I gave the cost of feeding Scottie's White Floss for the year at $89.42. This year the cost has been $113.85 as may be seen by the itemized account given below:—

Hay	2968 lbs.	@ $12.00 Per ton		$ 17.80
Silage	1600 "	@ 4.00 "	"	3.20
Turnips	180 bus.	@ 10 cts		18.00
Mangels	30 "	@ 15 "		4.50
Bran	1700 lbs.	@ 30.00 Per ton		25.50
Gluten Feed	1200 "	@ 36.00 "	"	21.60
Cotton seed meal	700 "	@ 45.00 "	"	15.75
Pasture 5 months		@ 1.50		7.50
				$113.85

Altho this is an increase of $24.43 over the cost of feed for last year, the difference would have been much greater if we had not bought bran and gluten by the car load at a low rate the fall of 1916.

To the above feed cost should be added the cost of the following items.

Labor.
Barn rent.
Interest on Investment.
Insurance on buildings.
Taxes.
Depreciation in value of cow.
Cost of utensils.
  Lanterns, oil, pails, strainers, cans, forks, shovels, wheel barrow etc.
Bedding.
Bull service.
Manager's time—whether recognized as manager or farmer.

Under present conditions these additional items, will figure up to from $60.00 to $75.00, and this added to the feed cost will make the bill for such a cow as Scottie not less than $175.00 per year. Her yield of milk for the year was 11,101 lbs. Its value at six cents per quart would be $266.40 or at the price paid by the Borden Milk Co., which was about $2.50 per 100 lbs. its value would have been $277.52.

It would look as if there was a lot of money to be made in keeping cows if this amount of profit is possible. The truth is however that it is not possible to get all Nova Scotia cows to give even half as much as Scotties White Floss. Cattle in the mass can only be improved slowly, and the possible average for all Nova Scotia's cows at the present time is less than 5,000 lbs. per year. When this is taken into consideration, it can be seen at once that the business is by no means as profitable as would be indicated by the returns from "Scottie." No doubt it does not take as much feed or as much labor to care for a cow giving 5000 lbs. of milk as for one giving 11,000, but the saving in feed is nothing like as large as the loss in milk. The value of 5000 lbs. of milk at 6 cents per quart is only $120.00 a sum of money that would hardly pay for the feed and the requisite labor, to say nothing of all the other expenses that must be met.

Swine.

The number of pigs raised during the year is shown in the following table:—

Breed..................	Litters	Average per litter	Total number
Yorkshire................	12	9.3	112
Berkshire	4	7.0	28
Cross Bred................ (Berk & York	3	9.3	28
		Total number of pigs...........	168

Of these pigs the greater number were sold at $5.00 each if not registered, and at $5.50 registered. Ten were retained on the farm for breeding purposes. Only four Berkshire sows bred on account of an accident to the boar secured last year from McDonald College. He injured one hind leg in some way and had to be slaughtered. We have secured a son of his from McDonald College to use this year. This is a fine young boar and he is doing exceptionally well.

Rosevale John 52nd. the big Yorkshire boar we have used for two years was sent to the experimental farm at Nappan and a young boar secured from J. E. Brethour & Nephews, Burford, Ont. This is a thicker built boar than those of the extreme bacon type, but very smooth and well proportioned. We also retained a young boar after Rosevale

John 52nd. out of one of our best sows. We will breed sows to each one of these boars and thus have litters not related next spring. At the present time, we have the following number of pigs on hand:—

2	young	Yorkshire	boars
4	mature	"	sows
6	young	"	"
1	"	Berkshire	boar
2	mature	"	sows
3	young	"	"

We are planning to increase our stock of swine this year in order to do as much as we can toward increasing the number of pigs available for feeding next summer. Instead of keeping 14 brood sows as we did last year we have increased the number to 20. In addition to this we have made arrangements to supply the Horticultural Department of this College with 4 brood sows, making a total of 24 to be kept at the College next year.

Test of Feeding Pigs.

Six pigs were kept from August litters for feeding purposes, 3 Yorkshire sows and 3 Berkshires.

They were removed from the sow at 6 weeks old and fed until 24 weeks old. The result of the feeding test was as follows:—

2 Berkshire Pigs.

Feed eaten from 6 weeks old to 24 weeks old, 126 days.

268 lbs. middlings at $2.40	$ 6.43
200 lbs. mixed feed at $2.70	5.40
7 bus. mangels at 20 cts	1.40
2897 lbs. skim milk at 50 cts. per cwt	14.48
Cost of feed	$27.71
Value of 2 pigs at 6 weeks old at $5.00	10.00
Total cost	$37.71

Live weight at 24 weeks old 352 lbs.

Dressed weight (79% of live weight) 278 lbs.

278 lbs. of pork at 20 cts.	$55.60
Cost of pigs as above	37.71
Returns above cost of feed	$17.89

2 Yorkshire Pigs.

Feed eaten from 6 weeks old to 24 weeks old, 126 days.

338 lbs. of wheat middlings at $2.40	$ 8.11
259 lbs. of mixed feed at $2.70	6.99
9 bus. mangels at 20 cts.	1.80
3560 lbs. of skim milk at 50 cts. per cwt	17.80
Cost of feed	$34.70
Value of 2 pigs at 6 weeks old at $5.00	10.00
Total cost	$44.70

Live weight of 2 pigs at 24 weeks old 432 lbs.

Dressed weight (73% of live weight) 315 "

315 lbs. of pork at 20 cts.	$63.00
Cost of pigs as above	44.70
Returns above cost of feed	$18.30

A comparison of the two lots shows that they practically gave the same net profit. The Yorkshires ate $6.99 worth of feed more than the Berkshires and produced $7.40 worth more of pork. These pigs were not butchered but the same percentage of dressed carcass is used as was obtained from similar pigs butchered last year. (see page 98 in 1916 Report). In spite of the high cost of pork the profit is not large, being an average of only a little over $9.00 per pig. In addition to this the test was started with 3 pigs in each lot, but on December 8th after being fed from Sept. 22nd or 77 days one Yorkshire pig suddenly died. He had eaten $6.71 worth of feed and was worth $5.00 when we started to feed him, making the total loss $11.71 which should be subtracted from the profit on the other 5 pigs. The 3 Berkshires pigs were fed all through the test but in the report given above only 2 are taken in order to make an easy comparison with the 2 Yorkshires. No charge has been made against the pigs for labor or interest or investment, which would amount to several dollars per pig. There would also be a small credit due the pigs for manure produced. Considering all these items the profit on the net operation could hardly amount to more than $7.00 per pig.

In wintering our brood sows we find mangels extremely valuable. An old sow can be kept for several months on mangels alone. Fifteen pounds of mangels and 2 lbs. of a mixture of bran and middlings in equal parts will keep them in excellent condition. Some clover hay put in racks where they can reach it is also very beneficial.

Requirements of the Department.

We are greatly in need of more room for implements. A machinery building, where all kinds of machinery could be conveniently stored, and where many types of engines could be operated, and implements examined and studied by the students would be of great practical benefit both to the farm and College. In such a building traction engines could be operated and the students given practice in handling them. In this way we could overcome to some extent the handicap of running a College course only in the winter.

Some repairs should be put on the main cattle barn next summer. The southern side of the roof should be shingled and the whole barn painted.

In conclusion I wish to thank all the employees of the Department for their efficient work during the year. Mr. Thos. Hooper has continued as Farm Foreman and has kept the work well up to time under exceptionally difficult conditions for securing labor. Mr. Wm. Retson is foreman in the cattle and swine department and the condition of the animals testifies to his efficient work. H. L. Trueman is my assistant in the office and has charge of keeping the farm records both for regular production and experimental work.

George Strudwick, a young man who graduated from this College in April 1917 was given charge in the Creamery on May 1st. When he reached military age he enlisted and left us to do his part in the great war on October 1st.

I am indebted to Professor Harlow for analysis of various farm products and to Mr. S. J. Moore of the Dominion Seed Department for securing seed corn and for assistance in planning work of growing roots for seed.

Respectfully submitted,

JOHN M. TRUEMAN.

PART 3—REPORT OF THE PROFESSOR OF BOTANY.

Professor M. Cumming, Esq.,

Sir:—I have the honor to submit the annual report for the Botanical Division.

To the junior class, instruction was given in general botany, a very general course, Systematic Botany, and an informational course in Plant Diseases. To the Seniors, Microscopy as an introduction to Advanced Botany and Bacteriology, Plant Anatomy and Physiology and an advanced course in Plant Diseases.

As the Senior class was small, more individual work was possible than in previous years. Besides the instruction proper much executive work in connection with the arrangement of classes and oversight fell to this department.

The season was not favorable for plant diseases and no widespread injuries from them resulted although locally some diseases prevailed. No serious new disease was reported and those that previously had been announced as new and serious, fortunately did not materialize or do much damage.

Weeds.

In my report last year I stated that a summary of the weeds occuring in Nova Scotia would be given this year. In making this summary no attempt to give the scientific names nor classification has been made and only so much of a description as would aid in the recognition of the weed or group of weeds is included. The purpose of the summary is to enable the farmer to more intelligently deal with weeds.

The number of serious weeds in the province is small when compared to any similar farming area elsewhere in North America. But while the number of different species of weeds is less the slowly developing spring and the long autumns are favorable for weeds and increase the difficulty of their extermination.

For practical purposes weeds can be placed into two groups, the Annuals, which are plants capable of producing a very large number of seeds each year and die. If such seeds are hardy and can survive for a long time in the soil then we have a bad weed. If in addition the plant has developed some efficient way of distributing its seeds, especially if it is about the size of cultivated seeds with which it grows or gets into the straw or litter and thus reaches the manure, it becomes a serious pest. The other group includes the biennials and perennials. They may take advantage of the early and late seasons to mature their seeds or grow and establish themselves or produce many runners or branches in or on the soil. Such weeds are usually even harder than the annuals to destroy as not alone the seeds but the plants and branches have to be killed.

Moss.—In old grass lands moss often becomes established. It is easily killed by plowing but it is also crowded out if the land is not too wet by top dressing. The use of fertilizers will restore the grass and thus crowd out the moss. It has been established that phosphates and some nitrogenous fertilizer would usually be more than paid for when applied to some grass lands without the necessity of plowing. On very poor soil, cradlehills and newly cleared "pasture" land plowing, manure and lime are desirable.

Horsetail or Thousand Joint. This is a very difficult weed to control on light soils. It is easily recognized by the plants pulling apart at each joint. There is another "Thousand Joint" but it does not separate at the joints as the "Horsetail" does. When cut with the hoe or plow the parts frequently grow and the weeding has doubled the number of weeds, Late fall plowing injures it and at the same time prevents its production of spores. It is usually impossible to cultivate the ground early enough to destroy the spore producing branches that appear early in spring, shed their spores and die. Thorough summer-fallow is efficient.

Spruce and Alder. These are easily killed by cutting in spring while the plants are small, after the leaves have expanded.

Couchgrass, and similar grasses that have underground stems. These are among the worst weeds and in ordinary cultivation take possession of the soil. If such land is left in grass for a number of years and then pastured these grasses become gradually choked out and other grasses come in. To remove them or rather to attempt to do so is expensive and wasteful as well as usually unsuccessful. The removal of so much humus either by carting it off or burning is a direct loss and should be discouraged. Thorough, very thorough summerfallow is required to kill it but if well done is efficient and not only leaves the soil in fine physical condition but also adds a large amount of humus to it

It is desirable to follow the fallowing with some rapid growing cover crop, to make assurance doubly sure. The fallow should be so conducted that no green plant is allowed to appear. A jointer or "skimmer" should be used on the plow at the first plowing also if necessary to secure the complete covering of the rootstocks in subsequent plowings. Within a week following the plowing it is to be thoroughly cultivated. If a good cultivator is not available then cross plow shallow. This shallow cross plowing or alternately cultivating should be repeated at intervals of a week or less so that no green appears. Longer intervals allow the leaves to start and revivify the rootstocks. One month of the growing season, depending upon the weather, is usually sufficient to kill the grass completely. That means at least five plowings and three cultivations. If the intervals permit the grass to get a start it greatly prolongs the fallowing. On this account only so large a piece should be undertaken as it is certain can be attended to.

A number of grasses called "Bunch Grass" from their habit of growing in bunches or clusters, gradually becomes established in lawns and meadows. Such grasses are inferior and unsightly. They should be avoided as far as possible by thorough preparation of the soil for seeding and the selection of clean seed. As soon as such bunches appear they should be removed with a grubber as they usually seed very early and scatter their seed before the crop is gathered.

Smartweed and Bindweed. These plants belong to the Buckwheat Family and are easily distinguished for like buckwheat they all have a curious covering extending from the base of the leaf and enclosing the joint, the ocrea. They are annuals and produce abundance of seed. They grow readily in all crops but grass. The seeds however remain alive for some years and are ready to grow when the ground is plowed. In hoed crops, they are easily killed when young but they ripen with the grain and are taken to the barn. Many of the seeds reach the field again in the straw and some often with the seed grain. It would usually pay to pull all such weeds from the grain while they are small.

Common Pigweed or Lamb's Quarter. This well known weed should be treated as in the directions for smartweed.

Red Rooted Pigweed. This is a coarse unattractive dirty green plant with a very large number of tawny flowers It grows rapidly and after it is too late to catch it with the cultivator or hoe, It flourishes almost wholly among hoed crops. The late plants should be pulled before they become too large. Earlier in the season the hoe and cultivator keep it under control.

Docks. Besides the common coarse docks that grow in every odd corner there are two that are common weeds. Field Sorrel on light sandy soil can usually be destroyed by rotation and manure, the tall docks that occur in moist land and dyke are rapidly becoming bad weeds. No satisfactory means of control has been discovered. The seeds are shed before the hay is cut.

Chickweeds. They grow everywhere and are among the hardest weeds to control. Few realize the full extent of their injuries to the growing crop. They rob it of nourishment and water and at the same time provide conditions favorable for disease. They produce an enormous number of seeds which live for some years in the soil. I have no data as to how effective summer fallowing would be but would expect that it would be efficient in sprouting the seeds and thus destroying this weed. Frequent hoeing is necessary in all hoed crops.

Corn Cockle and the Campions. These are essentially weeds of the grain fields. Their seeds are difficult to remove from grain even with the best fanning mills and they give to the ground grain a bad color and poorer quality besides reducing the yield. They are removed by pulling, first as many as possible when the grain is still short and again when the weeds are in bloom and conspicuous. This is rapidly accomplished if the person carries a cane of some kind and regularly inspects narrow strips back and forth across the field using the cane to mark his place when he has to move about the strip to pull the weeds. Clean seed for sowing and pulling these weeds is efficient treatment.

Buttercups. These are best removed with a hoe or grubber. If very numerous plow and crossplow or cultivate again in two or three weeks.

Mustard Family. The flowers of many weeds belonging to this family of plants resemble mustard or shepherd's purse in structure. They are annuals, produce a large number of seeds and are weeds chiefly in arable lands. Most of them do not grow in sod. They are easily killed in hoed crops but flourish in grain. In most mustards the pod splits open but in cadlock it breaks into pieces across between the seeds, and is practically impossible to separate from grain seed.

Where the farm is badly infested omit grain raising for a few years on the weedy fields or spray the grain fields with either green vitriol (See Note 18) or blue vitriol. For the latter, use three pounds in ten gallons of water and apply at the rate of sixty or seventy gallons per acre in dry weather. An application can best be made about two weeks after sowing the grain when the weeds cover the soil or if this has been impossible when the weeds are in bloom and hide the grain. If only a few weeds are present this is the time to pull them.

When possible cultivate the soil for some time before sowing and thus destroy the young and sprouting plants. The earlier spray is better as the grain yields better not being crowded during growth by the weeds.

Garden Orpine or Live-for-ever and a closely related plant, *the Mossy Stonecrop.* The first of these is often a troublesome weed in gardens. Not allowing a green leaf to show for about three weeks during the growing season is usually sufficient to kill it.

Spiraea Meadow-sweet, Hardhack or Steeplebrush. While these are not weeds in cultivated fields they are often troublesome roadside bushes. They are best killed by cutting as they come into bloom or cutting as soon as the leaves unfold in spring and again in autumn.

Potentilla, Cinquefoil or Five-fingers. In the eastern part of the province, particularly in Cape Breton, these plants become weeds. They increase in the hay lands to the injury of the hay.

Avens and *Agrimony* are occasional weeds in grass.

Lady's Mantle is well established as a weed at Yarmouth.

Yellow or *hop clover* is occasionally a weed also the wild perennial vetch although both may be useful and are not a trouble in hoed crops.

Mallow. The mallows are frequently weeds in grass land and are best cut out with a grubber.

St. John's Wort. These are occasional weeds in eastern Nova Scotia and more common westward. They are destroyed with good culture.

Mezereum. This is a bad shrub locally. It is best removed with a grubber.

Willow-herb or *Fire-weed.* This is very common in newly cleared land. It should be cut in bloom.

Evening Primrose. These occur in waste land and in grass. They should be pulled or cut with a grubber before they blossom.

Spikenard. This is occasionally complained of as a weed.

Parsnip and *Carrot.* These are locally bad weeds. If the land cannot be summer-fallowed as where the roadside is also full of weeds, it is best and cheapest to cut them out with a grubber as they are coming into bloom.

Caraway. This weed is steadily on the increase in our permanent grass lands. Where it is not too abundant it should be removed with a grubber where it is abundant the most thorough summerfallow is necessaty to kill it and then carefully remove all plants appearing after the next seeding.

Rhodora, Labrador Tea and *Lambkill.* It is often desirable to kill these bushes along roadsides and in newly cleared land. It is best to cut them either just after the new leaves appear or when in bloom.

Dodder. There are two species, one attacks flax and the other clover. Remove as soon as discovered.

False Flax. A weed often introduced with flax seed or grass seed. It is easily recognized by its general resemblance to flax but the pods are pear-shaped with the larger end up and the plant is slightly taller than the flax, so that by sighting across the field these weeds can be seen. It belongs to the mustard family.

Ground Ivy, Mints. These are among the worst garden weeds. Ordinary culture only increases their growth. Hoeing can kill them but must be thorough and constant and not allow them to recover by unfolding their leaves to the sun before another hoeing. One month's summerfallow is sufficient.

Hemp Nettle or *Dead Nettle.* This common annual occurs both in hoed crops and grain. As it ripens its seeds as it grows it usually has many seeds to shed by the time it is pulled. Care should be exercised that these seeds are not scattered but are burned.

Mullein, Butter and Eggs, and *Yellow Rattle* are essentially weeds of runout soil. Plowing, manure and good culture control them.

Plantains. These like the preceding are generally controlled by good farming.

The Narrow Leafed Plantain however grows well in good grass lands and should be removed with a grubber before haying as its seeds otherwise pass into the manure and the weed is scattered over the farm.

Yellow Daisy or *Blackeyed Susan.* Easily controlled by pulling or removing with a grubber.

Yarrow. This is one of our worst weeds. It is almost impossible to hoe it out when established. It increases in sod and chokes the better grasses. Spots where it is established should be left unseeded till the weed is killed by frequent digging over with a grubber, or covering. (See Note 17).

Chamomile (*Wild*). This weed is on the increase throughout the province along the highways and in grass lands. In doing roadwork it should be hoed out.

Mayweed or *Dog Fennel.* This weed is easily controlled by good culture. It should be cut just before it blossoms.

Ox-eye Daisy. In general, good farming crowds this weed out. Care should be taken to cut the hay early in fields where it occurs. I know a farmer who once gathered and cleaned from his clover hay twelve bushels of daisy seed thinking it was cloverseed. Where the seeds ripen before cutting they pass into the manure and return to the land.

Tansy and *Burdock.* These are easily controlled with a grubber.

Ragwort and *Stinking Willie.* The latter when cured in hay is the cause of the "Pictou Cattle Disease." Where they occur in hoed crops they are easily killed but in hay and pasture they are difficult to control. If not too numerous they should be removed with a grubber, but if common and the grass must be used for hay the weeds should first be removed as they come in bloom. Cut with a sickle close to the ground and carry them off and burn with brush, then cut the hay. Care must be taken to get all roadside plants and those in waste land and fence corners. Sheep eat them in pasture.

Canada Thistle. This is usually only troublesome in light soils or warm situations but is occasionally well established even in poor soil. If persistently cut off with the hoe as soon as the leaves appear it can be killed in a few weeks, but few will take the trouble. In case a field is infested the summerfallow is the best way to destroy them.

Knapweed, Horseknops or Hardhead. This weed is on the increase in grass lands. It resembles a thistle but without prickles. It should be removed with a grubber wherever it has become established.

August Flower or *Fall Dandelion.* This weed is crowded out by enriching the soil and by good culture. It is not so bad a weed as the common dandelion as it does not thrive so well in good soil.

Dandelion. This weed thrives in all soils but prefers good soil and situations. It is a hard weed to deal with. In the garden it can be controlled by thorough cultivation in early spring and in late autumn. On lawns by spraying with copper sulphate using a solution of at least three pounds to one hundred pounds of water and applying within two or three days after cutting the lawn with the lawnmower. Apply at the rate of sixty gallons per acre. Care must be exercised that the spray does not fall on bushes or ornamental plants as it might injure them. Repeat the spray two or three times, in each case following the lawnmower.

Annual Sow Thistle. This tall coarse thistle-like plant with its pale yellow flowers is easily recognized. It is chiefly a weed in gardens and hoed crops where attention with the hoe is efficient.

Perennial Sow Thistle. This is a more conspicuous weed than the preceding and much more serious. It has perennial rootstalks and large bright yellow heads of flowers. It grows well in all grain crops and cultivated land. It should be dug out with a grubber as soon as found and care taken to get all the underground roots and stems out.

Wild Lettuce.—This is sometimes a weed in shaded gardens. It is easily recognized by its very brittle stems.

Hawkweed, Orange Hawkweed, Paint Brush, King Devil etc. are some of the names applied to the members of the Genus Hieracium. These plants all have yellow to orange flowers and stolons or branches taking root so as to form a tangle of rooted branches over the surface of the ground. Where well established thorough summerfallowing is the safest way to destroy them but where recently introduced they may be removed with a grubber.

Notes.

1. Weeds in bloom when removed are likely to ripen seeds and must be burned or scalded.

2. The spray given under dandelion is injurious to all weeds and does not seriously injure grain. It must be applied in dry weather. It is very injurious to cabbage turnips and related plants.

3. Thorough preparation of the soil before the crop is put in reduces the number of weeds.

4. A proper rotation of crops check the growth of weeds.

5. The succession of hoed crops following one another destroys many weeds.

6. The cleaning or selection of clean seed for sowing prevents the introduction of many weeds.

7. The discovery and removal of noxious weeds as soon as they appear and before they become established is a very great advantage.

8. The removal of weeds when they are small is beneficial by giving the crop more room, light, moisture, and fertilizer and the crop yields more.

9. Weeds can be removed by pulling from many grain crops without too great expense if done before the crop is too tall.

10. Weeds should be removed from grass lands the first year after seeding. They are not likely to reappear and the hay is better and the yield larger.

11. Where perennial weeds have become established the soil may be summerfallowed either before or after a crop or during the summer depending on circumstances. During the summerfallowing no green plant should be allowed to appear. Either plow frequently or plow and cultivate alternately. Such tillage improves the soil quite independent of the killing of the weeds.

12. When possible it is a good practice to plow and cultivate the soil for some time either before sowing or after the crop is removed. Many weeds can thus be killed at small expense.

13. Care should be exercised to destroy all late maturing weeds that ripen their seed after the crop has been removed.

14. Annuals are not so efficiently killed or rather cleared from the soil by fallowing as are perennials as they usually produce so many seed that many will not be sprouted, hence they are better destroyed in hoed crops.

15. The cleanest soil, freest from weeds has many weedseed in it. Applications of manure increase the number of weeds. It is important that the weeds are removed from the grain and hay as otherwise their seeds pass with the straw and feed directly into the manure and back to the soil again.

16. A small can or bottle containing kerosene oil, strong carbolic acid or lye can be used advantageously in killing weeds on lawns and in fields where they occur widely scattered. A few drops of any one of these solutions on the crown of a plant in dry weather will kill the plant The application can be made rapidly and a noxious weed destroyed from a field or lawn without affecting its appearance. Large deeprooted weeds like the docks are thus destroyed easily. A few trials will show how much of the solution to apply.

17. A patch of weeds or a portion of a lawn which cannot be plowed can have the weeds with all other vegetation killed without injury to the soil by covering the piece with tarpaper, lapping the layers so that no light can get through and weight it so that it remains in place. In a few weeks all plants will be killed and the surface can be reseeded or planted as desired.

18. Green vitriol like blue vitriol can be used on lawns and grain but is harder to apply and discolors the lawn worse that the blue vitriol. It is much cheaper where the material is to be had. Use one pound to four pounds of water and apply at the rate of forty gallons per acre, or more. Many weeds are killed or injured. It is not to be used on cabbage, turnips or related crops.

19. The weeds on driveways and walks or where a crop is not to be grown for a year can be destroyed by applying large applications of salt, kerosene, carbolic acid or soda lye Other chemicals are occasionally used but possess no advantage over these. The salt is least and the lye most efficient. Boiling water is often used to kill weeds in walks and has the advantage that it does not track. The other substances should not be used where young children are, nor near the house where it will be carried in on the boots. Poultry and small animals are also liable to injury.

20. Weeds occur all through the growing season and require constant attention for their control.

Respectfully submitted,

H. W. SMITH.

PART 4—REPORT OF THE PROFESSOR OF ZOOLOGY AND PROVINCIAL ENTOMOLOGIST.

M. Cumming, B. A., B. S. A.,
Secretary for Agriculture.

Sir:—I have the honor to submit my Fifth Annual Report, being for the year 1917. The work covered during the year will be discussed under the following heads:—

1. General.
2. Brown-tail Moth Report.
3. Nursery Stock Inspection Report.
4. Experimental Report.
5. Apiary Inspection Report.
6. Conclusion.

General.

The regular classes in Entomology and Zoology were attended to as usual during the winter months, the necessary laboratory material being collected for the most part by members of the staff.

Progress continues to be made in the building up of a representative collection of Nova Scotian insects, especially economic forms. No special time is taken, however, from our other duties to carry on this work, as more import:-ant matters require the undivided attention of our staff. In happier times we hope to prosecute this phase of our duties more vigorously.

The work of preparing suitable illustrations to use in future publications is going ahead as rapidly as circumstances permit and the preparation of lantern slides, done in natural colors, where possible, still goes on to some extent.

As a result of the practical interest of Messrs. George E. Graham and R. U. Parker of the Dominion Atlantic Railway, we were able to get a moving picture film prepared showing each step of the various details of orchard spraying, as recommended by us, and we trust that this film will be of considerable educational value to the fruit growing pub lic. Mr. G. E. Sanders of the Dominion Entomologica Branch co-operated with us in the preparation of this film

Our correspondence, and the number of specimens submitted for identification, continues to increase, the number of inquiries sent in this season being almost double that of any previous year. Timely notes were sent to the press whenever occasion required, foretelling the advent of various pests, or giving directions for their control. Every effort was made to keep the practical side of the work before the public and in some cases, at least, it is known that this resulted in the saving of important crops that would otherwise have been partially destroyed.

No regular bulletins, other than those mentioned in last year's report, have been issued, but a popular circular on potato spraying was printed and distributed, and numerous articles were contributed to the agricultural and entomological press. A circular on orchard spraying was also prepared in co-operation with Mr. G. E. Sanders, and published as Circular No. 8, the Dominion Entomological Branch.

I have continued to act as secretary of the Nova Scotia Entomological Society and have attended to the editing and publication of the proceedings of this society and arranged the programme of the annual meeting. Addresses were delivered throughout the year to various farmers and fruit-growers meetings and entomological organizations.

General Features.

While this is merely an administrative and not a technical report, it will not be out of place here to mention a few of the more prominent insect outbreaks that have engaged our attention during the past year.

The so-called Salt-marsh Caterpillar (Estigmene acraea) was unusually abundant, attacking bean, sweet peas, potatoes, cabbages, turnips, nasturtiums and even apples. It was the commonest hairy caterpillar seen during the summer and attracted a great deal of attention. Under ordinary circumstances, it cannot be regarded as a serious pest as it is kept in check by its parasites.

The Zebra Caterpillar (Ceramica picta) has been on the increase for the past three years and this year appeared in enormous numbers in parts of the Annapolis Valley, where in some cases it did considerable damage. Repeated warnings were issued in the press and elsewhere regarding this pest, which it is hoped were of some benefit.

The Stem Borer (Gortyna micacea Esp.) was abundant and destructive, though probably the loss caused by the insect has been exaggerated. For part of the summer every mail brought at least one specimen of this pest and many complaints of its work reached us almost every day. Various articles appeared in the press regarding this "new potato pest," though the insect has been known in this country since 1907, and an article on its life history, as worked out at Truro, appeared in the Proceedings of the Nova Scotia Entomological Society in 1915. It is probable that the unusual abundance of the insect this year is due to the large number of new gardens set out in towns and villages, frequently in situations formerly overgrown with weeds. Several notes were sent to the newspapers explaining the true nature of the pest and giving directions for its control.

The White Marked Tussock Moth (Hemerocampa leucostigma) and the Rusty Tussock Moth (Notolophus antiqua) were still more numerous this season. They did great damage to the fruit in many orchards and will undoubtedly soon be sufficiently numerous to cause defoliation of shade trees in the towns.

The Canker Worm (Alsophila pometaria) has caused very serious loss in parts of the Annapolis Valley for the past three years and is now spreading to other sections of the Province. It is noticeable that orchards that are consistently and thoroughly sprayed each year as recommended, do not suffer from severe outbreaks of this pest. There is really no excuse for the defoliation of orchards such as has been so commonly observed during the past year.

Another member of the staff has been lost during the past year, viz. Mr. C. B. Gooderham, who resigned to accept the position of Assistant to the Apiarist at the Central Experimental Farm, Ottawa. Mr. Gooderham not only did the work of Provincial Apiarist, but also assisted in the entomological work throughout the winter months and, in addition to this, had charge of the laboratory work in Bacteriology. Mr. Gooderham was a keen observer and an efficient laboratory assistant. His services have been greatly missed. We were fortunate, however, through the courtesy of Mr. J. H. Grisdale, Director of the Dominion Experimental Farms, and Mr. F. W. Sladen, Dominion Apiarist, in being able to secure his services for a short time in the early summer to carry on the work against American Foul Brood. His account of this work appears later in this report.

We have been able to retain so far the services of a small but efficient staff, all of whom have had several years experience with the department. During the dormant season, scouting for nests of the brown-tail moth occupies the attention of all except Messrs. L. G. Saunders and H. G. Payne. The former is engaged in preparing illustrations, photographs and lantern slides for educational purposes, in general laboratory assistance and in inspection of nursery stock. Mr. Payne attends to the fumigation station at Truro and when not engaged in this work, he prepares, tabulates and indexes the specimens in our collections and prepares mounts for class work, etc.

Mr. C. F. U. Whitman has charge of the fumigation station at Digby and during the growing season is engaged in experimental spraying work and in inspection for San Jose Scale. Mr. J. P. Spittall, like Mr. Whitman, is a foreman on the brown-tail moth staff in the winter and in the summer he also looks after a series of orchard experiments. Mr. W. E. Whitehead has directly assisted me at Truro during the past summer in the general work of the department. In addition he took all the entomological records in connection with an experiment with the cabbage root maggot (Pegomyia brassicae). He further assisted in preparing illustrations of various economic insects. Mr. Walter DeLong helped in the spraying experiments during May and June, but during July and August he was at Truro, where he conducted, under my direction, certain experiments in potato spraying. Others who assisted in the brown-tail moth work only, were Mr. R. M. Sanford and Mr. H. J. M. Dunleavy. All of the foregoing have done most excellent service for the province and they are in a large measure responsible for any success that may have attended our efforts as a branch of the Provincial Department of Agriculture.

We have continued to work in the closest agreement with Mr. G. E. Sanders, Field Officer, Dominion Entomological Branch and with Mr. Paul A. Murphy, the local representative of the Dominion Division of Botany. This arrangement makes for greater efficiency and prevents overlapping of work.

Brown-Tail Moth Report.

The work of exterminating the brown-tail moth is carried out as formerly under the direction of the Dominion Entomologist; the province supplying one half the field force necessary to carry on the work. Mr. G. E. Sanders who formerly had immediate charge of the work has been relieved of this responsibility in order to enable him to devote his entire time and attention to the investigation of spraying problems. Mr. L. S. McLaine, who already has direction of the work in New Brunswick, has been assigned to the direct supervision of the work in Nova Scotia, as well. Mr. F. C. Gilliat who has had several years experience in the work has been made field foreman under Mr. McLaine.

As the Dominion Entomological Branch is responsible for the work, the report is transmitted by Dr. Hewitt as follows:—

Fredericton, N. B.,
September 29, 1917.

Professor H. W. Brittain,
Provincial Entomologist,
Truro, N. S.

Sir:—I beg to submit herewith the report of my officer, Mr. L. S. McLaine, who has charge of the brown-tail moth work, on the work carried on during the winter of 1916-17 in Nova Scotia with a view to controlling and preventing the spread of the brown-tail moth.

In addition to the activities described in this report which are conducted with the assistance of inspectors in your employ this department is undertaking the importation and colonization of the insect enemies of the brown-tail and gipsy moths with a view to securing to as great a degree and with as little loss of time as possible the natural control of the brown-tail moth. The results of this branch of the work has been encouraging so far.

It is of the greatest importance to point out, however, that the most important factor tending to prevent the brown-tail moth from becoming a most serious menace to the orchards and other trees of the Province is the more general adoption of spraying. It is the unsprayed orchards and wild trees that contribute more than anything else to the increase of this pest.

I have the honor to be, Sir,

Your obedient servant,

(Sgd.) C. GORDON HEWITT,
Dominion Entomologist.

Report of the Brown-Tail Moth Survey, Province of Nova Scotia. Season 1916-17.

Dr. C. Gordon Hewitt,
Dominion Entomologist,
Ottawa.

Sir:—I have the honour to submit the report of the campaign against the brown-tail moth carried on in the Province of Nova Scotia during the winter of 1916-17. As in previous years, this artificial control work has been under the direction of the Dominion Entomologist, Dr. C. Gordon Hewitt. One half of the inspectors were employed by the Dominion Government and the remainder by the provincial authorities. The work started on November 1st, 1916, and was completed on April 30th, 1917. During this time an average of ten inspectors were engaged in the field work.

The method of handling the work was practically the same as that employed in previous years, that is, the localities showing the heaviest infestations were inspected two or three times and the light infestations were gone over once. More emphasis was laid on the outer edges of the infested area, especially in the eastern section, in an endeavor to curtail the further spread of this insect.

A total of 10,019 winter webs were collected this past season in comparison with 14,845 found in 1915-16. The following table shows the total number of nests found in the various counties since the work began:—

Counties	1909–10	1910–11	1911–12	1912–13	1913–14	1914–15	1915–16	1916–17
Yarmouth....	0	12	10	3	1007	73	37	0
Digby........	414	3004	3688	5064	7699	5460	539	201
Annapolis.....	1070	1444	4333	5882	14572	12154	13439	9314
Kings........	0	2	39	105	845	554	825	501
Hants........	0	0	0	1	1	12	5	3
Cumberland..	0	0	0	0	2	0	0	0
Shelburne....	0	0	0	0	30	1	0	0
Locality unknown...	12	0	0	0	0	0	0	0
	1496	4462	8070	11055	24156	18254	14845	10019

The condition of the various counties in regard to the brown-tail moth may be summarized as follows:—

Yarmouth. No nests were found in this county this past season whereas in 1915-16 thirty-six nests were collected. The territory found infested last year was reinspected and found to be clean.

Digby. There has been a decided decrease in the number of nests found in this county for the past three seasons. This year 201 nests were found, exclusive of Bear River, in comparison with 539 in 1915-16. This decrease is due in part to the lack of a heavy flight from the New England States and also to the thorough work of the inspectors. With one exception all localities showed a decrease in the number of nests found. In 1911 a serious outbreak was reported at Weymouth, this was gradually reduced by thorough scouting. In the winter of 1915-16 a small island right under Weymouth Falls was scouted and found to be heavily infested. During that inspection 320 nests were gathered from wild thorn, rose and scrub growth. Early in the spring of 1916 the growth was spread with oil and burned over. The results were very satisfactory, no nests were found on the island this past season and very few in the surrounding country.

Annapolis. On account of the Bear River district being partially in Annapolis and partially in Digby counties, it has been included in this county for convenience. Although there has been a great reduction in the number of nests collected in this county this past season, 9,314 as compared with 1915-16 when 13,439 were taken, the situation is not entirely satisfactory. This is not due to any negligence on the part of the inspectors who have performed their work conscientiously and well but to the field conditions as they exist at the present time. The brown tails have become established in this county and are breeding to some extent and if it were not for thorough and repeated inspections would increase and spread very much more rapidly. The favorite food plant of this insect is the apple and its near relatives. This is borne out by an examination of the list of host plants but it will spread to and feed upon other plants including some deciduous forest trees. Every effort has been made by the inspectors to thoroughly examine the orchards and remove all the nests and thus reduce the danger of the insect spreading to the forest trees and becoming established as a forest as well as an orchard pest, in which case the control work would be very seriously handicapped. But it is a physical impossibility in many cases to thoroughly examine the orchards on account of the height and neglected condition of the individual trees. There remains one other method of control which will do more than anything else to supplement that already in practice and bring about the desired results and that is spraying. The annual report of the Secretary of Agriculture for Nova Scotia for 1914 shows that only 37½% of the orchardists of this county spray. It is to be hoped that this percentage will rapidly increase and bring about a co-operation which is anxiously awaited by both the Dominion and Provincial Governments.

In 1915-16, a serious infestation was found on the mountain side south of Torbrook, over two thousand nests were collected. Early in the spring the infested area was treated in a similar manner to the island at Weymouth. This past season showed a great reduction in the number of nests found.

Hants. On account of the number of nests found in the eastern portion of Kings, this county was inspected and scouted as far east as Mosherville and along the Minas Basin shore to Noel Bay. Fortunately only three nests were found, two at Hantsport and one at Newport Landing.

Colchester and Cumberland. A scouting trip was made from Londonderry Station to Port Greville to find out whether the moth has spread across Minas Basin and infested these counties. It is gratifying to note that no winter nests were found.

The brown-tail moth winter nests were found on the following list of host plants during the past three years:—

Plant	1914–15	%	1915–16	%	1916–17	%
Apple	15524	85.51	10966	74.32	8746	87.29
Pear	839	4.62	759	5.14	412	4.10
Thorn	835	4.59	1812	12.28	335	3.34
Oak	223	1.22	162	1.97	185	1.84
Plum	285	1.05	215	1.45	154	1.53
Wild Pear	319	1.75	320	2.16	84	.83
Elm	26	.143	5	.03	31	.309
Wild Rose	5	.02	386	2.61	28	.27
Sweet Cherry	41	.22	18	.12	17	.169
Wild Cherry	10	.05	37	.25	8	.079
Maple	14	.07	21	.14	5	.049
Beech	0	0.0	5	.03	3	.029
Quince	20	.11	9	.06	6	.059
Alder	0	0.0	3	.02	2	.019
Birch	3	.016	21	.14	1	.009
Willow	1	.005	2	.01	1	.009
Poplar	2	.011	1	.006	1	.009
Spiraea	1	.005	5	.03	0	0.0
Bayberry	1	.005	3	.02	0	0.0
Mountain Ash	1	.005	2	.012	0	0.0
Currant	0	0.0	1	.006	0	0.0
Raspberry	0	0.0	1	.006	0	0.0
Hazel	0	0.0	1	.006	0	0.0
Black Cherry	2	.011	0	0.0	0	0.0
Acacia	1	.005	0	0.0	0	0.0
Sycamore Maple	1	.005	0	0.0	0	0.0

An examination of the above list shows that although the number of nests collected vary from year to year the percentage of nests found on the different species of plants is more or less constant. The apple and its close relatives are the more favored plants and this accounts for the large percentage of nests found on these trees. The increase on thorn, wild rose and wild pear in 1915-16 may be attributed to the discovery of the two heavy local infestations previously mentioned. Most of the nests were found on these plants. However, the brown-tail caterpillar is able to live and thrive on numerous other plants as is shown by the list.

Old nests were found at the following points. The term progeny may be explained as meaning the number of new nests found within a radius of fifty feet of the old nest.

Locality	No. Old Nests	No. Progeny
Annapolis	5	67
Bear River	8	81
Round Hill	5	55
Clarence	9	98
Belleisle	1	5
Torbrook	3	27
Deep Brook	3	43
Nictaux	2	114
Tupperville	1	8
Upper Granville	2	2
Bridgetown	3	18
Williamston	1	12
Weston	1	0
Tremont	3	16
Auburn	1	20
Cunard	1	2
East Torbrook	1	25
Grafton	1	0
Highbury	1	31
Sunnyside	1	7
Granville Centre	1	10
	54	641

The average number of progeny per old nest is 1 to 11.87.

The total number of localities found infested this past season was 110 as compared with 136 for 1915-16. Twenty-one new infestations were found this year and forty-seven localities were found to be free from nests this past season which were infested last year.

The efficiency of the work rests to a great extent upon the integrity of the individual scouts and my sincere thanks are due to them for their earnest co-operation. I also wish to express my thanks to Mr. F. C. Gilliatt, first assistant, whose assistance and advice have been greatly appreciated and facilitated the carrying on of the work.

I have the honor to be, Sir,

Your obedient servant,

LEONARD S. McLAINE,
In Charge, Brown-Tail Moth Work.

Fredericton, N. B.,
September 27th, 1917.

Nursery Stock Inspection Report.

The details of the work of inspecting nursery stock are contained in the following reports of Mr. H. G. Payne and Mr. C. F. U. Whitman, having charge of this work at Truro and Digby respectively.

W. H. Brittain, B. S. A.,
Provincial Entomologist,
Truro, N. S.

Sir —I hereby submit the following report of the inspection of nursery stock, the fumigation station at Truro, for the spring of 1917. The season opened on March 15th but the first shipment did not arrive until March 23rd, the heaviest shipments being made from the middle of April to the first week in May. However, owing to the congested condition of freight traffic, twenty three shipments arrived after the importation season, as laid down in the regulations, had closed. The last shipment was received on June 11th. The total number of shipments inspected from March 23rd to June 11th was one hundred and twenty-four.

The following list represents the number of plants inspected and number destroyed (owing to the presence of San Jose Scale) according to their respective classes.

Class	No. Plants Inspected	No. Plants Destroyed
I.	3927	74
II.	4863	11
III.	2084	2
IV	2208	0
V	3854	0
Totals	16936	87

The fees collected for this inspection amounted to $149.45 and the expenses incurred for truckage, etc., were $4.25, leaving a balance of $145.20. This of course does not take into account the salary and expenses of the inspection or the cost of fumigation.

In conclusion I would like to suggest that some change be made in Sec. 5, Class V, of the present regulations for the collection of inspection fees. Under the present condition an importer can purchase stock from some section infested with San Jose Scale and providing the shipment is valued at $75.00 or over is entitled to the minimum inspection fee. On the other hand an importer who places an order to the value of $65.00 or $70.00 with some firm in an apparently non-infested area, pays the maximum fee. The difference in the number of plants between these shipments might be very small, while the work of the inspector is perhaps doubled inspecting the stock consigned to the man who pays the lowest fees. Furthermore it be strongly urged that all packages containing nursery stock must have a statement of the contents attached.

I desire to thank you, Sir, for your assistance and interest in connection with this work. Thanks is also due Messrs. W. E. Whitehead and L. G. Saunders who gave valuable assistance from time to time with the inspection.

Respectfully submitted,

H. G. PAYNE.

W. H. Brittain, B. S. A,
Provincial Entomologist,
Truro, N. S.

Sir:—I have the honor to submit a report on nursery stock inspection, the fumigation station at Digby, for the spring of 1917.

The spring season for importing such stock opened on March 15th and closed May 15th. It is a rare occurrence, however, for stock to arrive before April 1st. In view of this fact, I left the Brown-Tail Moth inspection on March 31st and reported for duty at the fumigation station on April 1st, giving this line of work my entire attention until the season of importing closed.

The earliest date of arrival of any importation this season was April 11th and the latest inspection made was May 17th.

Mr. Walter DeLong reported for duty as assistant on May 1st. Prior to that date I had to hire some outside assistance in order to forward stock promptly. It would perhaps be advisable to appoint an assistant on April 15th, as the heavier shipments arrive between that date and May 1st.

The following lists represent numbers of plants inspected and number condemned according to their several classes.

Class	No. of Plants inspected	No. of Plants condemned
I	1609	228
II	2166	6
III	10700	393
IV	5500	0
V	510	0
	20485	627

Total fees collected on the foregoing shipments amounted to $80.27. Against this we have incidental expenses for travelling, extra help, telephoning, etc., amounting to $8.43 leaving a balance of $80.84.

I desire to thank you for the assistance you have given and interest shown at all times in connection with our inspection work.

Respectfully submitted,

CROFTON F. U. WHITMAN.

Changes indicated in the foregoing reports, which in my opinion, should be followed are the abolition of the minimum fee on shipments worth $75.00 or over and the passing of a regulation requiring a statement of contents to accompany each shipment. The inspection fees have been found to bear lightly on the larger shippers and it sometimes happens that where the minimum fee is assessed, it hardly meets truckage charges. On the other hand small shipments frequently have to be assessed at a comparatively high rate. The labelling of all shipments with a statement of contents will save our inspectors much valuable time in making records and computing fees. Another valuable addition to our regulations would be a clause requiring the separate shipment of nursery stock subject to inspection and that exempted therefrom. Both these latter regulations are now in force under the regulations of the Dominion Act.

Experimental.

Detailed reports of experimental work are published elsewhere but the following brief allusions to the various investigations we are conducting is thought desirable.

The greater part of our work with the green apple bug, (Lygus communis var novascotiensis Knight) has been completed but we are still continuing experimental spraying on a larger scale. Twelve acres of old, heavily infested orchard on the farm of Mr. J. Elliott Smith, Wolfville, N. S., have been treated this year with most gratifying results. Smaller experiments have been carried on at various points, all with good effect. Orchards that have borne no crops as a result of the work of this pest have been enabled to bear profitable crops or put in such a condition that they can bear profitable crops in future years. Our experiments have demonstrated fully that, though expensive, the treatment we recommend for this pest brings returns disproportionate to the cost.

Our main work with the apple maggot (Rhagoletis pomonella Walsh) has likewise been completed but we continue to clear up minor points, not fully worked out before, and still follow up the spraying work in some of the orchards. So far all our work tends to confirm the results published last season.

Our investigations into the various aphids that attack the apple are still yielding interesting and valuable results. At the present time we have under investigation the following species:—Aphis pomi DeGeer, Aphis sorbi Kalt., Aphis bakeri, Aphis brevis, Aphis solanifolii and Erisoma lanigera Hausm, We are also studying the following orchard leaf hoppers:—Empoa rosae Linn, Empoasca unicolor Gill., Idiocerus fitchi Van D. and Idiocerus provancheri Van D. We have also worked out the life history and habits of the following orchard tree hoppers:—Ceresa bubalus Fitch, Ceresa taurina and Stictocephala inermis.

The life histories of a number of Lepidopterous pests have been worked out at Kentville, including, Estigmene acraea, Ceramica picta, Hemerocampa leucostigma, Notolphus antiqua and a number of others.

At Truro we have begun, in co-operation with the horticultural department, an investigation of the life history and control of the cabbage maggot (Pegomyia brassicae). The past year's work has been of a preliminary character but we have already obtained results that are suggestive for future work. The problem is equally the work of the horticultural department and Prof. Shaw has shown much interest in its development. Mr. James Allen has assisted in the preparation of the material and with advice and Mr. James Dickson has given much time and thought to the working out of the details of the experiment, as well as giving his constant attention to the horticultural side of the problem. The entomological records have been very carefully taken by Mr. W. E. Whitehead of our staff.

A problem in the spraying of potatoes and in the cheapest and most effective arsenical poison for use with potato beetles has been conducted during the past season. In this work we have worked in close consultation with Mr. Paul A. Murphy of the Dominion Division of Botany, who is conducting similar experiments. The actual work of this experiment was performed very satisfactorily by Mr. Walter DeLong and we are indebted to the horticultural department for the use of their spraying apparatus, man and team. Striking results have been obtained in this work, but the compilation of the same hasnot been completed as yet.

The experiment to determine the financial returns obtained by ordinary orchard spraying over a period of years, is still being carried on at Bridgetown.

At Port Williams, we have begun a thorough study of the comparative values of spraying and dusting combinations for use in orchard work. This will need to be carried on for some years before definite conclusions can be drawn.

Apiary Inspection Report.

Mr. C. B. Gooderham, formerly Provincial Apiarist, is now on the staff of the Dominion Experimental Farms, Ottawa, but we have been able to secure his services for the essential work of apiary inspection this year and have the promise of his assistance for a short time next season. The services of a competent apiarist are badly needed in the province, as this industry has been considerably neglected. The continued inspection of apiaries to prevent the spread of American Foul Brood and to forestall the introduction and spread of new diseases is imperative. Without the services of such an official all government legislation is useless.

The keeping of bees affords a ready method for increasing the available food supply and, if properly conducted, the industry is a profitable one, requiring little capital to make a beginning. At present the right man is not in sight, but we hope to be able to secure one in the near future

Mr. Gooderham reports as follows:—

W. H. Brittain, B. S. A.
Provincial Entomologist.

Sir:—I forthwith submit my second report on Apiary inspection. Owing to my appointment as assistant to the Dominion Apiarist early in the season, I was unable to spend more than twenty days on this work.

Last year the work consisted mostly of a general inspection of apiaries throughout that part of the province where bees are more generally kept and to instruct bee-keepers in the better methods of bee-keeping. The inspection showed us that American Foul Brood, which had been discovered in the province two years ago, was practically confined to the Cornwallis Valley. It was, therefore, considered advisable to spend the short time at my disposal in giving all the assistance possible to the bee-keepers in this district, by making them better acquainted with the disease, and the methods of treatment, and by treating as many cases as time would permit.

Owing to several cold wet days I was unable to make much progress during the first part of June, but later on was able to visit most of the apiaries in which disease had been found the previous year. A few of these which had consisted of only one or two colonies either had been destroyed by the owner or the bees had died during the winter through the weakening effect of the disease. In others, one or two colonies had died and others had become affected. In two apiaries where a very slight attack was found in 1916, no sign of the disease could be found this spring. However, this does not mean that the disease is altogether absent, as affected combs or honey may cause a fresh outbreak later on. A careful watch should be kept in all cases. Mr. C. Hogan of Church St. and Mr. G. S. Pineo of Chipman's Corner, treated several cases of Foul Brood in their vicinity, also in their own apiaries, and no trace of the disease could be found at any of these places, showing that foul brood can be successfully treated, and that, with proper care and management, the apiary can be kept free from it. In all, twenty-five apiaries were visited and over one hundred colonies were inspected. Thirteen cases of disease were treated by the double shake method, which required two separate visits to each apiary treated. A demonstration was also arranged for and held in the adjoining apiaries of Mr. S. Dickey and Mr. E. Eaton of Canard. Owing to the lateness of the season and the rush of other farm work, this was not so well attended as it was hoped.

My thanks are due to Prof. Blair, Superintendent of the Experimental Farm at Kentville, for arranging and advertising the above mentioned demonstration, and especially to Mr. G. S. Pineo who also helped to make this demonstration possible, and, on several occasions gave me freely of his time and assistance in the inspection and treatment of foul brood. I also wish to thank Mr. S. Dickey and Mr. E. Eaton for their kindness in allowing the use of their apiaries for demonstration purposes. The hearty co-operation given by all the bee-keepers visited helped to make the work congenial and successful.

The following table gives the names of places visited with number of colonies found diseased last year, the number which died during the winter through disease and the number found affected this spring:—

	No. Diseased 1916	No. Diseased 1917	No. Found Dead from Disease	Fresh Out-break
Atlanta	1	0	1	0
Centreville	4	0	3	0
Canard	3	2	1	0
Upper Canard	8	7	3	2
Chipman Corners	2	0	0	0
Kentville	1	0	0	0
Port Williams and Church St.	11	0	1	0
Steam Mill Village	4	0	0	0
Sheffield Mills	5	5	2	2
Upper Dyke	1	0	1	0
Wolfville	2	0	1	0
	42	14		

It will be seen from the foregoing table that the number of affected colonies have decreased more than fifty per cent.

This is due chiefly to the fact that after foul brood had been discovered in an apiary in 1916 the owner was anxious to have it treated at once. In this way many cases were successfully treated at Port Williams, Church St. and Steam Mill Village by Mr. C. Hogan and Mr. G. S. Pineo. A few individual cases were treated by the owners themselves.

It will also be seen hat the disease had spread to new colonies at Upper Canatrd and Sheffield's Mills.

I was unable through lack of time to visit North Grand Pre, Coldbrook and Woodside; one affected colony was found at each of these places last year. The diseased colony at Woodside was treated by the owner last year, but as I did not visit the place this year I cannot say if the treatment was successful.

Next year it is hoped that all these places may be reached early in the season and that any fresh outbreak of the disease may be treated at once. By this method it is possible that this scourge of bee-keeping may be exterminated.

In conclusion I wish to again thank you for the interest you have shown and for the help you have rendered me during the two years I have been engaged in this work.

Respectfully submitted,

(Sgd.) C. B. GOODERHAM.

Conclusion.

It will be seen in comparing this report with that of former years that in spite of a small staff there has been little, if any, slackening of the work. We have had to close our laboratory at Smith's Cove for lack of suitable assistance, but our main problem there was finished, and the loss was partially compensated for by the taking up of new lines elsewhere. With the possibility of a still further depletion of our staff, we must formulate plans to keep going, if at all possible, the promising and important lines of work that have been undertaken and in which progress has been made. With the greater interest that has arisen in the conservation of food supplies, the services of the entomologist becomes increasingly in demand. There are many problems still unsolved that only require time and patience to unravel. When we consider that the annual loss from pests is greater than the total provincial revenue, the necessity for a still more vigorous prosecution of this work becomes apparent. Non-essential work may be postponed but not educational and experimental work bearing directly on the food supply.

With the progress of the great world conflict, many problems that at first seemed unsurmountable, have been met and, in a measure at least, they have been overcome. On the other hand the menace of a world food shortage still exists. Only under certain conditions is increased acreage possible, but all can take some measures to check the easily preventable losses due to insects. It is no credit to any man to plant crops and have them fail through neglect. The farming public must be brought to a realization of the fact that attention to these apparently unimportant details may be an important factor in "winning the war."

In conclusion, I again beg to extend to you, my thanks for the support, assistance and encouragement that I have always received at your hands.

Respectfully submitted,

W. H. BRITTAIN.

PART 5—REPORT OF THE PROVINCIAL HORTICULTURIST.

To M. Cumming, B. A., B. S. A.,
Secretary for Agriculture,
Truro, N. S.

The following is my Annual Report as Horticulturist for the year 1916-17.

The spring of 1917 was so cold and wet that it prevented the early working of the land and the early planting of garden crops. It also caused the latest blooming of fruit trees for a number of years. The first apple blossoms did not appear until June 9th, nearly two weeks later than normal. There were no damaging late spring frosts but the weather continued cold and backward until July. Through August and September it was mostly fine and dry. A heavy gale which occurred on August 10th blew off fully 20 per cent. of the apple crop in the main part of the fruit district and in Digby and Yarmouth Counties about three quarters of the crop. In the latter section many fruit and ornamental trees were uprooted or broken down by the wind. Sometimes a wind merely thins the apple crop without materially lessening the yield. In this case the yield was lessened.

On September 9th a heavy frost occurred which not only killed potatoes, corn, tomatoes and other tender vegetable crops, but practically ruined what had been a promising cranberry crop. Although the apple crop was late in coming to maturity the fine, dry weather of September caused the development of a high color in varieties normally colored, the quality being correspondingly improved.

The weather through June and July was favorable to the development of black spot and susceptible varieties, like Gravenstein and McIntosh Red in unsprayed orchards were badly affected.

The first shipment of early varieties of apples from the Annapolis Valley took place about August 21st, fully two weeks later than in 1911 and the picking of Gravensteins did not begin until after September 20th, which was ten days later than usual. Winter varieties ripened up at their usual time in October.

The Garden Movement in Nova Scotia in 1917.

Early in the season of 1917 the idea became widespread throughout this country and the United States that there was likely to be a serious shortage of food in the world before the harvest of 1918. Everyone was recommended by the press and by public speakers to plant as largely of all the staple food products as possible. Those who had the use of any land at all were urged as a patriotic duty to plant it to food producing crops. In addition to the patriotic motives impelling people to grow all the food possible many were induced to do so on account of the rising cost of living and the higher prices paid for ordinary articles of food.

The Division of Horticulture endeavored to aid in this work in as far as it could be done along with the regular work. Meetings were addressed in several places, letters for the press were sent out, and circulars on garden operations sent to all who requested them. In connection with the orchard demonstration work eleven demonstration vegetable gardens were carried on.

In several towns of the Province the garden movement was encouraged by patriotic organizations and by private individuals. Managers of industrial establishments encouraged their employees to plant and to care for garden plots. In some towns prizes were offered and garden contests held. The Division of Horticulture rendered assistance by furnishing judges for garden competitions in some of these towns.

The conditions under which most of the gardening in the Province was done during the past season were less favorable to the growth of the finer crops, like onions and celery, than to easily grown crops, like beans and potatoes. In many instances the aim was to produce as much as possible of the staple food stuffs rather than of what was considered the horticultural luxuries. The land was often newly devoted to garden purposes, sometimes being land just taken from sod. It was therefore not well suited to the growth of the finer vegetable crops but was such as might give good results with beans and potatoes, cabbage, corn or turnips. These crops were largely planted in all the gardens and in some cases potatoes and beans were the only crops attempted.

The potatoes grown in these gardens were mostly intended for home use. Usually very little attention was given to the selection of the varieties or of the seed used. The planters took for seed whatever was at hand or was most easily obtained. Sometimes an early variety, like Early Rose or Beauty of Hebron, was selected but often the growers did not even know the name of the variety planted. Similarly with beans, the varieties planted were those most easily obtained without regard to their adaptation to any special conditions. There is no doubt that an improvement could be obtained in the garden results if attention were given to the selection of suitable varieties. Some varieties of vegetables are early, some are late, some are more productive than others, while some are desirable because of their quality. Certain kinds of beans for instance may fail to produce a full crop because they require too long a season.

With potatoes the tastes of most families might be satisfied by the selection for an early variety of one of the following: Early Rose, Beauty of Hebron, or Early Ohio; and for a main season or late potato, if white potatoes are preferred, one of the following: Green Mountain, Dreer's Standard or Carmen No. 1. If there is no objection to a colored variety there are some advantages in growing such local varieties as McIntyre, Calico and O'Brien.

Many persons prefer a light colored potato, some like a dark kind while others have no preference. Most persons prefer a mealy potato to a waxy or a soggy variety. Mealiness is said to increase with the increase in starch content, but if too much starch is present the tubers become coarse and woody. The point of all this is that the potatoes vary much in their characteristics and if persons growing garden crops for home use stopped to consider their preferences in this and other vegetables or formed an ideal of what they wish to obtain, they would get more satisfaction and pleasure out of their garden work.

While in many instances these gardens in 1917 were carried on under the disadvantage of the soil being in a poor physical condition, there was in the aggregate much extra food produced by means of them. In 1918 there will be an even greater need of food production than in the past. The garden soil will be in much better tilth because of the cultivation it received last season. In some cases the gardeners have begun the preparation for next season by manuring and plowing the ground in the fall. On the whole the gardens in 1918 should give much better results than in 1917.

Demonstration Vegetable Gardens.

In 1915, partly for the benefit of the demonstration orchards and partly to illustrate the advantage of growing vegetable garden crops, a demonstration vegetable garden was started in each of three young orchards in Cape Breton. The number was increased the next year and in 1917 there were eleven such gardens planted. The original object was to acquaint country people with a variety of easily grown vegetables, to show the best ways to grow these crops and to emphasize the advantage of having plenty of fresh vegetables in their daily diet. An additional aim was to ensure the needed cultivation and fertilization for the fruit trees in the demonstration orchard, since the proper fertilization and cultivation of garden crops in an orchard is also beneficial to the trees. The following are the names and addresses of orchard owners having demonstration vegetable gardens in 1917:—

Mr. Emery De Long, Barss Corner, Lunenburg County.
Mr. Wynn Crouse, Bridgewater, Lunenburg County.
Mr. E. S. Hendry, Milton, Queens County.
Mr. Geo. Martin, Kempt, Queens County.
Mr. James Cruikshank, Sunny Brae, Pictou County.
Mr. Geo. A. King, Oxford, Cumberland County.
Mr. John S. Scott, Rocklin, Pictou County.
Mr. Frank L. Fulton, Upper Stewiacke, Colchester County.
Mr. D. A. McDonald, Whycocomagh, Inverness County.
Mr. A. D. McCuish, Loch Side, Richmond County.
Rev. J. N. McLennan, Glendale, Inverness County.

The assistance extended to the owners of these gardens included 167 pounds of acid phosphate, 100 pounds of nitrate of soda and garden seeds sufficient for a plot of one-third of an acre. Assistance was also given in the laying out of the garden and the sowing of the seeds. The owners furnished the manure and labor necessary to prepare and care for the gardens.

The quantity of seeds sown was what was thought sufficient for the average farm garden and included the following:—

Beans, Refugee	½ lb.	.20
" Wardwell's Kidney Wax	½ "	.20
Beets, Crosby Early Egyptian	8 oz.	.60
" Long Dark Red	4 "	.45
Carrots, Chantenay	2 "	.40
Cabbage, Danish Ball Head	1 pkg.	.10
Corn, Golden Bantam (1 pkg.)		
" White Cory 1 pkg., 2 pkgs. or	½ pt.	.20
Cucumber, White Spine	½ oz.	.10
Lettuce, Grand Rapids	1 pkg.	.05
Onions, Yellow Danvers	1 oz.	.40
" sets	1 lb.	20

Parsnips, Student or Abbott's	4 oz.	.25	
Peas, Nott's Excelsior	1 lb.	.30	
“ Gradus	1 “	.35	
Pumpkin, Sugar	½ oz.	.05	
Radish, Non Plus Ultra	½ “	.05	
Spinach, Victoria	1 “	.10	
Squash, Hubbard	½ “	.05	
Swiss Chard	2 “	.20	
Tomato, Earliana	1 pkg.	.10	
Turnip, (Swede), Holborn Invicta	2 oz.	.10	
			——$4.55

The gardens were intended to be object lessons for the neighborhood in which they were situated. The following reports from Mr. E. S. Hendry and Mr. A. D. McCuish show the results obtained from their gardens, fairly representing the average of all:—

Mr. Hendry says: "On the whole I think my garden was a success. It at least attracted the interest of the passers by and I have answered questions regarding varieties, culture, etc. as best I could. Turnips yielded 4 bushels, carrots 6 bushels, parsnips 3 bushels, beets 3 bushels, beans 10 pounds of string beans, peas 25 quarts green, 1 quart ripe, onions 18 pounds, tomatoes 2½ bushels green and 20 pounds ripe, cauliflower 16 heads, cucumbers 12 or 14 dozen, squash, Hubbard 130 pounds, pumpkin 100 pounds, corn a good supply of choice corn for our own use and more for sale."

Mr. A. D. McCuish reports from his garden, 30 bushels turnips, 18 bushels carrots, 5 bushels parsnips, 4 bushels beets, ½ bushel beans, 1½ bushels peas, ½ bushel onions, 1¼ bushels tomatoes, 1 dozen each of squash and pumpkins besides cucumbers, cauliflower, Swiss chard and radish.

It may be questioned whether the efforts of a farmer at gardening always results in an increase of the food supply of the country since the time employed in gardening may be taken from the production of some farm crop which also would have added to the food supply.

It is certain, however, that a diet made up to a large extent of fresh vegetables is economical, wholesome and agreeable and that in normal times country people do not provide themselves with that variety and abundance of garden products which they could easily do. Vegetable gardening is intensive farming and, when successful, returns a large amount of food to the acre, far larger than does ordinary farming. Vegetable gardens also through their variety of crops, as well as the high value of these crops, and were eleven such gardens planted. The original object was to acquaint country people with a variety of easily grown vegetables, to show the best ways to grow these crops and to emphasize the advantage of having plenty of fresh vegetables in their daily diet. An additional aim was to ensure the needed cultivation and fertilization for the fruit trees in the demonstration orchard, since the proper fertilization and cultivation of garden crops in an orchard is also beneficial to the trees. The following are the names and addresses of orchard owners having demonstration vegetable gardens in 1917:—

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It is certain, however, that a diet made up to a large extent of fresh vegetables is economical, wholesome and agreeable and that in normal times country people do not provide themselves with that variety and abundance of garden products which they could easily do. Vegetable gardening is intensive farming and, when successful, returns a large amount of food to the acre, far larger than does ordinary farming. Vegetable gardens also through their variety of crops, as well as the high value of these crops, and the skill and attention required to grow them, appeal to the interest of the owner more strongly than do the common field crops. Vegetable gardens are usually situated near the home and are easily accessible to the members of the household. Hence it is that garden work is often done after regular working hours, as a pleasure, because of the genuine interest which the owner or some member of the family has in the work. Garden work is sometimes done as a pastime, or a hobby, taking the place of games or other recreation. Gardening, then, is a work which readily lends itself to any effort for increased food production by the great mass of people engaged in other occupations. Much of what is done in the home garden is that much done extra. The farmer and the members of his family would find in home gardening a pleasant and profitable diversion, even though it appears much like his other work, and a means of reducing his living expenses and materially adding to the food supply of the country. We are warned that in the coming months a food crisis is imminent. If, as a people, we are to put forth our utmost efforts at this time for the cause to which we are devoted, one safe direction for this effort, whether of farmers or of others, is in the growing of vegetable garden crops.

The Demonstration Orchards.

In 1914 the Division of Horticulture undertook some work in orchard renovation with several orchards of bearing age situated in different parts of the Province, but mostly outside the fruit district. The object was to see what improvement could be made in the general health of the trees, in their growth and the yields of fruit, by giving them proper treatment as to cultivation, fertilization, pruning and spraying. In some cases, undesirable varieties were grafted out. Some of the orchards had been more or less neglected, showing the results of this neglect in the shaggy bark of the trunks and larger limbs, in the moss covered twigs and branches and stunted twig growth as well as in poor yields of fruit. The trees were first thoroughly pruned, all the diseased and dead wood being removed as completely as possible. The trunks and larger limbs were scraped to remove the rough bark which sheltered the hibernating and scale insects. The trees were then given a dormant spray of lime-sulphur and later in the season three summer sprays of the same mixture. The ground was plowed late in the Fall or in early Spring. It was given the usual tillage through May and June, that is, it was harrowed every week or ten days and after every rain until the first part of July and then sowed to cover crop to occupy the space until the end of the season. The orchards were fertilized with acid phosphate, 400 pounds per acre and nitrate of soda 200 pounds. At the beginning of the operations muriate of potash was used at the rate of 200 pounds per acre, but after the first season this fertilizer was no longer available.

As a result of this treatment the orchards have improved in health and growth and in yield of fruit, though as yet the yields have not increased as much as was expected. This would seem to be due in part to the character of the seasons following 1914 which generally have not been good apple years, especially when compared with our two best years, 1911 and 1912. The orchards mostly consist of two-acre plots, except the one owned by Rev. Father Semery, Hectanooga, which is about 4 acres, and the orchard at Orangedale, the bearing part of which is only about one-half acre.

Mr. Wynn A. Crouse of Bridgewater, Lunenburg County, reports a yield of 75 barrels of apples from his orchard in 1917. The trees have made an average twig growth of ten inches, some trees growing 23 inches.

Mr. Emery De Long, Barss Corner, Lunenburg County, reports a yield of apples this year of 40 barrels, the trees making good growth.

Mrs. H. E. Everett, Bridgetown, Annapolis County, reports a yield of 86 barrels, growth of twigs fair, foliage poor, burned with spray.

Mr. D. M. Brown, Pugwash, Cumberland County, reports a yield of 50 barrels. The trees look very much better than formerly, the leaves having stayed on later than usual.

The yield in the orchard at Hectanooga was 42 barrels and would have been larger except for the heavy gale in August.

No report has been received from the orchard at Orangedale this year owing to the owner's illness or from the one at Annapolis owing to the owner's having enlisted for service at the front.

One additional demonstration orchard was taken on at West New Annan this year, owned by Mr. George Anderson.

Several demonstration orchards have shown the need of under-drainage in a part or in the whole of the area. With the co-operation of the owners a beginning has been made in laying tile in the orchards at West New Annan the skill and attention required to grow them, appeal to the interest of the owner more strongly than do the common field crops. Vegetable gardens are usually situated near the home and are easily accessible to the members of the household. Hence it is that garden work is often done after regular working hours, as a pleasure, because of the genuine interest which the owner or some member of the family has in the work. Garden work is sometimes done as a pastime, or a hobby, taking the place of games or other recreation. Gardening, then, is a work which readily lends itself to any effort for increased food production by the great mass of people engaged in other occupations. Much of what is done in the home garden is that much done extra. The farmer and the members of his family would find in home gardening a pleasant and profitable diversion, even though it appears much like his other work, and a means of reducing his living expenses and materially adding to the food supply of the country. We are warned that in the coming months a food crisis is imminent. If, as a people, we are to put forth our utmost efforts at this time for the cause to which we are devoted, one safe direction for this effort, whether of farmers or of others, is in the growing of vegetable garden crops.

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The question is sometimes raised as to the advisability of using commercial fertilizers on apple orchards in this Province. The results of tests which have been made in New York State would seem to show that, under the conditions of the experiments there, the use of commercial fertilizers on apple orchards is not always profitable to the owner. The general practice and recommendation in the fruit district of Nova Scotia has been to make liberal use of fertilizers on bearing orchards. There probably is a wide difference between soil conditions in New York State and in this Province. Many instances could be cited to show the apparent profit in the use of fertilizers on fruit trees here, especially when barnyard manure is not available, as it usually is not in orcharding on a large scale. Some experiments which have been started with fertilizers on fruit trees in the horticultural work at Truro, as well as some with the demonstration orchards in different parts of the Province, were undertaken with a view to finding out, if possible, the value of fertilizers on crops of this kind.

The Model Orchards.

The thirty-five model orchards set in different parts of the Province are intended to answer questions similar to those to be answered by the demonstration orchards, as to culture, fertilization and drainage. Since these orchards have been planted by the Department of Agriculture, they are also intended to answer the questions as to the suitability of different sections of the Province to fruit growing and the best varieties to plant in these sections. As might be expected from the nature of the case some model orchards have succeeded and a few apparently have failed. With the latter an effort is being made to discover the cause of failure. Sometimes failures with orchards arise from the planting of poorly grown trees, wrong varieties, planting on poor sites, or on too wet or too shallow soils or with too bleak an exposure or from neglect or some other cause. Sometimes a section of country is unusually subject to late spring frosts, and to heavy freezes in the winter. Fruit trees may not thrive in such places without unusual precautions being taken for their protection. Where such uncontrollable conditions exist it is useful to understand the difficulties, so that those trying to grow fruit may do so with the least loss and disappointment.

In several model orchards where the trees have not developed according to expectations the question has arisen as to whether or not the cause might be due to lack of drainage in the soil. Accordingly, tile underdrains have been laid in a few orchards, such as at Glendale, Inverness County, and Oxford, Cumberland County, and arrangements have been made to put in underdrains in the orchards at Meteghan Station, Digby County and Rocklin, Pictou County. The results of this treatment will be carefully watched and recorded.

Some of the model orchards which have done the best this year are Mr. J. A. Wallace's orchard at Gore, Hants County, planted in 1903 which had a crop of 75 barrels of apples; Mr. John Brown's orchard at West Lochaber, Antigonish County, planted in 1904, 71 barrels; Mr. Lewis L. Smith's orchard, Black River, Inverness County planted in 1902, 30 barrels. Two young orchards, of about one acre each, one belonging to Mr. E. S. Hendry, Milton, Queens County, planted in 1907, bore 7 barrels, the other, owned by Mr. D. A. McDonald, Whycocomagh, Inverness County, planted in 1911, bore 5 barrels.

College Horticulture.

The Horticulture at the Agricultural College consists of (1) teaching, (2) correspondence and (3) growing the horticultural crops for ornamentation, demonstration and experimentation. The third division comes chiefly under the direction of Mr. James Allan, Horticultural Superintendent.

The lawns around the new Science Building, under the management of Mr. Allan, have now become pretty well established. Much of this ground consists merely of subsoil, the top soil to the depth of 2 to 10 feet having been removed for purposes of grading. The making of a lawn under such circumstances presented some difficulties, because of the poverty of the soil in humus and fertilizing materials. These difficulties were overcome by plowing in a light coat of well-rotted manure in the summer of 1916, harrowing and seeding with a lawn grass mixture and a nurse crop of winter rye. An application of bone meal and acid phosphate was harrowed in along with the grass seed. The lawn mixture used consisted of:—

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Kentucky Blue Grass (Poa pratense)...	8 lbs.
Canadian Blue (Poa compressa).......	15 "
Red Top (Agrostis alba vulgaris)......	5 "
Rhode Island Bent grass (agrostis alba Canina).........................	5 "
Sheep fescue (Festuca ovina)..........	5 "
Timothy (Phleum pratense)..........	9 "
White clover, (Trifolium repens).......	3 "
	50 lbs. per acre

Nurse crop of rye.

There should be some planting of shrubs around the Science Building next spring.

The flowering shrubs, consisting of spiræas, loniceras' barberries, viburnums, Philadelphus and prairie roses' around the College building and on the campus are doing well. In the fall of 1915 those shrubs around the College Building were heavily manured and in the spring the manure was dug in. On account of winter killing in the winter of 1915-16 they were severely pruned back. In the past two seasons they have made vigorous new growth and now present a good appearance.

The evergreens planted around the Horticultural Building consisting of Norway spruce, Austrian pine, arbor vitae and retinosporas were badly winter killed during the winter of 1916-17. Either they had not become sufficiently established to withstand the winter or the position is too exposed for these shrubs. Possibly deciduous shrubs would do better here even if they do not get as much sun as desired, and would flower as well as they would in a sunnier position.

The Northern bank of the Salmon River, which is on the Southern boundary of the College Farm, was once covered with a heavy growth of native evergreen trees. Many of these trees have reached their full growth and have either died or have been cut and removed. Parts of the bank are bare of vegetation of any kind and the soil is slipping down into the river and washing away. In order to prevent this loss and also to make profitable use of this slope of land the Horticultural Division has begun the planting of this bank with evergreens, such as Pinus sylvestris, Pinus strobus and Larix Europea as well as with cuttings of several willows growing in the horticultural nursery. The evergreens were planted in the spring of 1915.

Several hundred willow cuttings were put in in 1916 and 1917. Most of the evergreen trees are doing well and all of the willows have taken root and promise to succeed.

The College Orchard.

In the latter part of June alternate strips of land between the rows of trees in the College orchard were sown to red clover. The remaining strips were planted with hoed crops, such as tomatoes, potatoes, cabbage and beans. These hoed crop strips have all been plowed to a depth of 7 or 8 inches this fall and are to be planted again with hoed crops next spring. The other strips are to be left in clover sod through the season of 1918 when the clover will be plowed under for humus. The trees have grown well this year, such varieties as Duchess, Dudley and Wealthy having borne good crops.

Plumdell Orchard.

The apple orchard at Plumdell set in 1914 and consisting of about 5 acres has, so far, grown very well. There were some twenty-three trees which had to be replaced this spring, due mostly to winter killing. Yellow Transparent trees from the nursery at Plumdell were used for this purpose. This is an early variety, the wood as well as the fruit ripening early in the season, consequently the trees withstand the winter better than the late growing sorts. Later they will be top grafted to the desired kinds. Some of the trees in the Plumdell orchard have already borne some fruit, and a record is being kept of the performance of each tree. Dwarf apple trees planted around the border of the Plumdell orchard in 1916 have done well and bore some fruit in 1917.

In 1915 one acre on a steep slope in the centre of Plumdell Farm was planted to pears, plums, and cherries. The ground has been kept in clover for two seasons to prevent washing of the soil and to add to the supply of humus and nitrogen. The trees have been kept well mulched.

Of late years cherry and plum trees have been difficult to get because of the regulations governing the importation of nursery stock into this Province. If delay occurs in planting in the orchard, or if the trees are subject to drying out in the process of transplanting, they are quite likely to fail to grow. Considerable loss has occurred especially with cherries in this respect, both in planting at the Agricultural College and elsewhere in the Province. The best safeguard against this danger is to get the trees as fresh

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Bush Fruits.

The bush fruit plot of one acre planted with gooseberries, currants and raspberries, in 1915 has grown well and is just coming into bearing. Downing and Red Jacket gooseberry especially seem to be doing well and also Cherry, Fay's and Black Champion currant. Varieties of raspberries which were obtained as Cuthbert, Turner and Yellow Queen have not done as well as Marlboro, the yield being small and the fruit undersized.

Demonstration Cottage Garden.

In the latter part of May a plot 20 x 50 feet at the west end of the College Orchard was spaded and manured for a cottage garden. The ground was hard and lumpy due to the packing it had received from carting and tramping over during the building of the cottage near-by. However, it was brought into fair condition by planting time.

The object was to see how much could be obtained from a garden of this size. Consequently the rows were placed as close together as it was thought would give the largest yield. Some of the ground was double planted, lettuce and early beets being interplanted with such longer season crops as cabbage and tomatoes. The short season crops were harvested and out of the way when the longer season crops needed the room.

The results from this garden were fair. Next season, with the soil in better tilth a larger return will be expected. The following quantities of vegetables were obtained.

Parsnips	¾ bus.	1 peck	Spinach
Beets	¾ "	120 heads	Lettuce
Carrots	½ "	3 quarts	Peas
Early cabbage	8 head	1 peck	Beans, string
Late Cabbage	10 "	1 bushel	Turnips
Celery	40 "	¾ bu.	Tomatoes gree
Sweet Corn.	22 ears	4 qts.	" ripe
Potatoes	1¾ bushels		

Control of Clubroot in Turnip and Cabbage.

The experiment begun in 1916 with lime in the control of clubroot on turnips and cabbage was continued in 1917. The same plots which were limed and fertilized for this work in 1916 were used again this year. The land was prepared the same as last year but no fertilizer or lime was applied this season. The plots were sown, planted and cultivated the same as in the previous year, with the exception of the cabbage, which was planted 2½ feet in the rows and 3 feet between the rows, making 100 plants to the plot.

The cabbage did not all mature. Many plants died through various causes and had to be replaced during the season. In some cases plants were replaced as many as five times.

The following table shows the percentage of both cabbage and turnips free from clubroot on the different limed and unlimed plots.

	Burnt Lime Plots		Crushed Lime Plots				Checks	
							A	B
Tons per acre	4½	9	4	6	8	12		
Cost " "	61.88	$123	$16	$24	$32	$48	0	0
Percentage free from Clubroot								
Cabbage.....	11	75	9	25	3	19	0	0
Turnips.....	57	80	7	10	46	64	0	0
Average.....	34	77.5	8	17.5	24.5	41.5		

Eight tons of crushed limestone is chemically equivalent to 8960 lbs. or nearly 4½ tons of burnt lime. Reference to the above table will show that with cabbage the freedom from clubroot with 4½ tons of burnt lime per acre was 11%, with 8 tons of crushed limestone it was 3%. With turnips the results were 57% and 46% respectively for burnt lime and its equivalent of crushed limestone. The averages for the two vegetables were 34% and 24.5% respectively.

The beneficial effects of lime in controlling clubroot were much better than would appear from these figures. Percentage free from clubroot means absolutely free. Plants which are only slightly affected with the disease and which would ordinarily be harvested for feed were discarded. On the other hand a considerable part of the yield from the check plots was made up of plants which had received some lime from the harrowing of the limed plots.

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Turnips.....	57	80	7	10	46	64	0	0
Average.....	34	77.5	8	17.5	24.5	41.5		

Eight tons of crushed limestone is chemically equivalent to 8960 lbs. or nearly 4½ tons of burnt lime. Reference to the above table will show that with cabbage the freedom from clubroot with 4½ tons of burnt lime per acre was 11%, with 8 tons of crushed limestone it was 3%. With turnips the results were 57% and 46% respectively for burnt lime and its equivalent of crushed limestone. The averages for the two vegetables were 34% and 24.5% respectively.

The beneficial effects of lime in controlling clubroot were much better than would appear from these figures. Percentage free from clubroot means absolutely free. Plants which are only slightly affected with the disease and which would ordinarily be harvested for feed were discarded. On the other hand a considerable part of the yield from the check plots was made up of plants which had received some lime from the harrowing of the limed plots.

Growing of Vegetable Seed.

In 1916 seed was grown from carrots (Danvers Half Long), parsnips (Student and Abbott's Hollow Crown) Swede turnips (Holborn Invicta and Corning). The seed of the parsnips was good but the carrot seed was poor. The quality of the roots grown from this seed, as judged by the flesh, was good in the case of the parsnips and turnips but poor in the case of the carrots. Carrots grown from seed received from R. & J. Farquhar, Boston, were of better quality.

The land for the seed crop this year was the same westerly strip of the Plumdell orchard. It was manured and fertilized as in 1916. The vegetable seeds grown were parsnips (Student), Swede turnip (Corning) and beets (Carter's Crimson Globe). The area planted in each crop was as follows: parsnips 1440 square feet, Swede turnip 1055 square feet, beets 960 square feet, from which was obtained 8 pounds of parsnip seed, 19 pounds of turnip seed and 18 pounds of beet seed, all seemingly of good quality.

Fertilizer Experiment on Potatoes and Wheat.

A fertilizer experiment is being carried on in Plumdell apple orchard to test the relative value of phosphoric acid from three different sources, acid phosphate, slag and bone meal. The orchard contains thirteen rows of trees and twelve strips of ground between these rows of trees. A three-year rotation is carried on in the orchard, four strips being seeded with grain (rye or wheat) and clover, four being in clover sod and four in potatoes. These crops are kept well away from the tree rows, which receive clean cultivation, the strips along the rows being sown to a cover crop in July. The rotation of crops for each strip between the tree strips is grain, clover and potatoes. The treatment with regard to fertilizer is as follows: Strips Nos. 1, 5 and 9 receive yearly an application of slag at the rate of 500 pounds per acre, strips, Nos. 2, 6 and 10 acid phosphate 400 pounds per acre, strips Nos. 3, 7 and 11, bonemeal 320 pounds per acre, strips Nos. 4, 8 and 12 are checks.

The analysis of these fertilizers was, for the basic slag used in 1915 and 1916, 12.8% available phosphoric acid, in 1917, 12%; for the acid phosphate in 1915 and 1916, 16% available phosphoric acid, and in 1917 14%; bonemeal in 1915 and 1916, 5% soluble and 18% insoluble phosphoric acid, total 23%; in 1917 total soluble and insoluble 20%. The bonemea also contained 3% ammonia.

The varieties of potatoes grown on these strips were as follows:—Irish Cobbler, Green Mountain, Dreer's Standard, Garnet Chili and Empire State. In 1917 the average yield per acre on each strip was as follows:—

Fertilizer	Basic Slag 500 Lbs. Per Acre	Acid Phosphate 400 Lbs. Per Acre.	Bonemeal 300 Lbs. Per Acre	Check.
Bushels per acre	276.96	280.32	288.16	260.08
Increase over check.......	16.88	20.24	28.08	....

The profit apparently from the use of fertilizers in this case works out as follows:—

Cost of Fertilizers.	Price of increased yield at 80c per bu.		Extra Profit
320 lbs. Bonemeal at $34 per ton....................	$ 5.44	$ 22.46	$17.02
400 lbs. Acid Phosphate at $22 per ton............	4.40	16.19	11.79
500 lbs. Basic Slag at $17 per ton....................	4.25	13.50	8.25

The yields of wheat on the different fertilized plots were as follows:—

Plot	(12) Basic Slag 500 lbs. per acre.	(11) Acid Phosphate 400 lbs. acre	(10) Bone meal 320 lbs. per acre	(9) Check
Yields in bushels per acre........	16.8	14	18.2	15.3

Potato Seed Selection.

Work in the selection of seed potatoes which was begun in 1916 under the rules of the Canadian Seed Growers' Association was continued in 1917. Three seed plots were planted with seed from ten 1916 hills each of Garnet Chili, Dreer's Standard and Irish Cobbler. On account of the pressure of other work the planting of these potatoes was not done until July 3rd. The frost of September 9th prevented any further growth. The crop this year therefore had a short season in which to grow and the yields were

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Plot	(12) Basic Slag 500 lbs. per acre.	(11) Acid Phosphate 400 lbs. acre	(10) Bone meal 320 lbs. per acre	(9) Check
Yields in bushels per acre........	16.8	14	18.2	15.3

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Table Showing weights of original hills of potatoes and average weights of hills grown from these.

Hills grown 1916	Weight of Hills 1916	No. of Hills Grown from this Hill in 1917	Average Weight of Hills grown in 1917
A2— 1 Garnet C	22.5 oz.	8	6.6 oz.
A2— 6 " "	21 "	7	8.8 "
A4— 2 " "	26 "	7	7.8 "
A5— 3 " "	26 "	6	7.2 "
A5—12 " "	29.5 "	11	6.5 "
B2— 5 " "	25.5 "	8	10.3 "
B4— 4 " "	30 "	10	7.9 "
B4— 9 " "	35.5 "	11	8.7 "
B4—11 " "	24 "	6	8.0 "
B4—12 " "	35.5 "	12	6.6 "
C2— 1 Dreer's S	38.5 "	11	22.7 "
C2— 5 " "	43.5 "	11	22.9 "
C5—10 " "	43 "	8	21 "
C6—11 " "	38.5 "	10	16.8 "
C7—12 " "	43.5 "	13	22.4 "
C7—19 " "	37 "	8	16.3 "
C9—11 " "	45 "	12	19.2 "
C9—16 " "	35.5 "	9	17.1 "
C10—4 " "	33 "	10	27.5 "
C10—18 " "	48.5 "	9	29.2 "
D3— 9 Irish C	32.5 "	8	23.6 "
D3—12 " "	34 "	7	21.3 "
D7— 4 " "	33 "	6	27.9 "
D7—12 " "	36.5 "	10	22.9 "
D8— 7 " "	32 "	7	20 "
D9— 5 " "	34 "	7	28.6 "
D9— 6 " "	31 "	8	24.9 "
D9— 8 " "	32.5 "	7	24.7 "
D10—1 " "	31.5 "	9	22.3 "
D10—11 " "	32 "	9	24.4 "

Curly Dwarf.

In the potato seed plot in 1916, 34 hills of Dreer's Standard were planted from a 1915 hill which weighed 3 lbs. 7 ozs. On August 7th, 1916, these hills were inspected by a representative of the Dominion Division of Botany and were all found to be badly affected with curly-dwarf. When the potatoes were dug they were all undersized, or under half an ounce each, and not worth harvesting, except in hills C8—1 and C8—26, which produced 3½ ounces of potatoes each. In the spring of 1917 the product of all the thirty-four hills was massed and 19 hills planted from the lot. At the end of the season only two of these 19 hills had tubers of over 1 ounce each. The average weight of the nineteen hills was 4.12 ounces.

Likewise in 1916 leaf roll and curly dwarf were found in twelve hills of Irish Cobblers, all grown from one 1915 hill which weighed 1 lb. 14 ozs. The average weight of the tubers produced in these 12 hills was 9.5 ounces per hill, all small potatoes. The tubers in the smallest yielding hill, D1—12, weighed 6 ounces. From the product of this hill five hills were planted in 1917, producing an average weight of 11.35 ounces per hill.

This result is in accordance with the explanation given as to why small potatoes from the run of a pile are sometimes unsatisfactory for seed purposes. Such potatoes are more likely to come from diseased or low yielding hills than are the larger tubers. If, however, the small potatoes are taken from productive hills the results might be different.

In the fall of 1916 some potatoes of selected seed stock were obtained from Mr. Fred Fawcett of Sackville, N. B. These included four hills of Green Mountain, four hills of Irish Cobbler, both lots being registered seed, and three hills of Irish Cobbler, ordinary stock. The hills were made up as follows:

Green Mountain (Registered seed)

Lot 1.

No. 1	Hill, 20 potatoes	5 lbs.	7 ozs.
No. 2	" 26 "	9 "	11 "
No. 3	" 29 "	9 "	0 "
No. 4	" 25 "	9 "	8 "

Lot 2. *Irish Cobbler* (Registered seed).

No. 1	Hill 18 potatoes	6 lbs.	12 ozs.
No. 2	" 16 "	4 "	7 "
No. 3	" 16 "	4 "	11 "

smaller than normal. Late planted potatoes, however, are said to produce good tubers for the next season's planting. These potatoes will be useful for testing this theory next year. While, under the circumstances, a comparison with yields of 1916 would be of little value, it is interesting to note how the average yield per hill for each group varied as compared with the 1916 yields of the hills from which these groups were planted.

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B2— 5 " "	25.5 "	8	10.3 "
B4— 4 " "	30 "	10	7.9 "
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C7—12 " "	43.5 "	13	22.4 "
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C9—11 " "	45 "	12	19.2 "
C9—16 " "	35.5 "	9	17.1 "
C10—4 " "	33 "	10	27.5 "
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Green Mountain (Registered seed)

Lot 1.

No. 1	Hill, 20 potatoes	5 lbs.	7 ozs.
No. 2	" 26 "	9 "	11 "
No. 3	" 29 "	9 "	0 "
No. 4	" 25 "	9 "	8 "

Lot 2. *Irish Cobbler* (Registered seed).

No. 1	Hill 18 potatoes	6 lbs.	12 ozs.
No. 2	" 16 "	4 "	7 "
No. 3	" 16 "	4 "	11 "

Irish Cobbler (Ordinary seed).

Lot 3.

3 Hills 16 potatoes 4 lbs. 9 ozs.
Average of 1 lb. 8 1-3 oz. per hill.

From the first hill of Green Mountain 35 hills were grown in 1917 having an average weight of 3 lbs. 1.2 ozs. per hill; from the second hill, 58 hills, average weight per hill 3 lbs. 2 ozs.; third hill, 59 hills, average weight 2 lbs. 5 ozs. per hill; fourth hill, 43 hills, average weight per hill, 3 lbs. 1 oz.

From the first hill of Irish Cobbler, 36 hills were grown with an average weight of 2 lbs. 10 ozs. per hill. From the second hill, 36 hills, average weight per hill 3 lbs.; third hill, 15 hills, average weight per hill 3 lbs. 5 ozs.; fourth hill, 28 hills, average weight per hill 3 lbs. 4 ozs.

From the three ordinary hills 14 hills were grown with an average weight of 2 lbs. 11.26 ozs. per hill.

It will be noticed that with the registered seed stock the average weight of the hills grown in 1917 did not in any case equal the weight of the original hills from which these were grown. Nor was the weight of any of the 1917 hills equal to the weight of the original hill of registered seed stock, while with the ordinary seed stock of Irish Cobbler the average of the hills grown this year was well above the average of the three hills used for seed.

The College Garden.

At the College the same plot of land was used for vegetable garden as last year. The ground for this garden consists almost entirely of subsoil which was removed from the site where the new Science Building stands. It has taken two years to bring the soil into fair condition for vegetable growing. The ground was first manured and plowed in the fall of 1915 and plowed again in the spring of 1916. It was occupied with vegetable garden crops in 1916 on which a moderate amount of commercial fertilizer was used. It was manured and plowed in the fall of 1916, and plowed again in the spring of 1917. This piece of ground is used for demonstration purposes as a vegetable garden and to some extent for experimental purposes. This year it produced some fine vegetables.

The whole garden was divided into three plots, on the first of which were grown peas and beans, cole crops, onions and leeks, celery, peppers, martynia, tomatoes and sweet corn, besides salad crops, potherbs and sweetherbs. The second plot was entirely devoted to the cucurbits—pumpkins, squashes, cucumbers, vegetable marrows, citrons and muskmelons. The third plot was occupied chiefly with early potatoes but contained a few hills of New Zealand spinach.

The aim has been to have represented in this garden all the vegetables which should be found in a complete kitchen garden. As in former years, tests were also made here on a small scale of new varieties of vegetables with special regard to earliness and suitability for our climate and of different cultural methods.

Tomatoes.

Twelve varieties of tomatoes were grown this season. Some of these—Peach, Red Cherry, Yellow Plum, and Strawberry, sown on March 8th, Golden Queen, sown on 14th March, and Golden Sunrise, sown March 14th, and April 12th—were grown mainly for exhibition purposes as there was a very limited sale for them. The remaining varieties were more strictly commercial sorts and were grown both in the College Garden and College Orchard. Sowings of these were made at different dates in March and April.

I. Early Crop.

The first sowing was made on March 14th of the varieties given in Table I, and was made to obtain ripe fruit at the earliest possible date. The seedlings were transplanted into flats and finally shifted to 5-inch pots with the exception of Sunnybrook Earliana which was potted up directly into 5-inch pots from the seed flat. The plants were set out from the pots in the field about the middle of June, in single row plots.

Table I shows the total marketable yields and yields of ripe fruit of the different varieties and also gives the date of picking the first ripe fruit. The yields and earliness can thus be compared.

Irish Cobbler (Ordinary seed).

Lot 3.

3 Hills 16 potatoes	4 lbs.	9 ozs.

Average of 1 lb. 8 1-3 oz. per hill.

From the first hill of Green Mountain 35 hills were grown in 1917 having an average weight of 3 lbs. 1.2 ozs. per hill; from the second hill, 58 hills, average weight per hill 3 lbs. 2 ozs.; third hill, 59 hills, average weight 2 lbs. 5 ozs. per hill; fourth hill, 43 hills, average weight per hill, 3 lbs. 1 oz.

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Table I shows the total marketable yields and yields of ripe fruit of the different varieties and also gives the date of picking the first ripe fruit. The yields and earliness can thus be compared.

Marketable yields for 29 plants

	Ripe		Green		Total		Date of first picking
	lbs.	oz	lbs.	oz.	lbs.	oz.	
Sunnybrook Earliana (Bp) 10 plants	255	9	34	4	289	13	6 Aug
Carter's Earliana (6) 29 plants	174	7	33	11	208	2	29 July
Spark's Earliana (Bp) 29 plants	150	3	24	8	174	11	26 July
Bonny Best(G) 29 plants	146	14	20	7	167	5	27 July
Carter's Sunrise	101	5	64	14.5	166	3.5	10 Aug
Alacrity (R) 29 plants	130	4	26	7	156	11	26 July

Note that the plot of Sunnybrook Earliana had only 10 plants, but the yield proportionate to 29 plants is given for comparison with the other varieties. This variety has given the highest yield, which may be partly due to the fact that the seedlings were potted up direct to 5-inch pots without any intermediate transplanting.

II. Main Crop.

In last year's report it was recommended that the ordinary main crop sowings be made during the first three weeks in April at intervals of a week between each two consecutive sowings. This season sowings were made on April 12th and 19th and also one as late as April 26th to ascertain how late it was expedient to sow. The variety used was Carter's Earliana. Unfortunately the early and continuous frosts in September prevented the taking of useful records on the main crop and only the records of the yields of ripe fruit up to September 7th can be given. These will be found in Table 2.

Table 2.

Sowing	Yield of Marketable Ripe Fruit. to 7th Sept. per acre				Date of 1st. Picking
	bus	lbs.	oz.		
12th April	166	8	8	(50 lbs. bushels)	22 Aug.
19th April	156	4	6.5	" "	20 "
20th April	90	39	15.3	" "	23 "

Last season sowings were made as late as April 25th to find out how late it might be expedient to sow. So far as the two years' experience goes it would show that a fairly satisfactory yield may be expected from such late sowings, but for best results it would be safer to sow earlier than April 25th. The recommendations of last year will therefore stand.

III Comparison of March and April Sowings.

To compare the early sowing of March 14th with one made in April a sowing was made on April 12th of Carter's Earliana and Sunnybrook Earliana. The plants from the April sowing were grown in plots of the same size and lying side by side with the 14th of March sowing recorded in Table I.

The comparison is seen on reference to Table 3.

Table 3.

Carter's Earliana.

Marketable Yields for 29 plants.

Sowing	Ripe lbs.	Ripe oz.	Green lbs.	Green oz.	Total lbs.	Total oz.	Date of 1st. Picking
14th March 29 plants	174	7	33	11	208	2	29 July
12th April 29 plants	112	14	50	15	163	13	20 Aug.
Sunnybrook Earliana.							
14th March 10 plants	225	9	34	4	289	13	6 Aug.
12th April 29 plants	124	15	35	6	160	5	20 Aug.

In last year's report it was stated that higher total yields and higher yields of ripe fruit had been obtained from potted plants of the early March sowings than from the twice transplanted plants of the early April sowings and also earlier ripening fruit. The above records show that the total yields and the yields of ripe fruit are also higher from the potted plants of these early March sowings than from the once transplanted plants of early April sowings. Further, the March sowing of Carter's Earliana was 3 weeks earlier in ripening and the same sowing of Sunnybrook Earliana was two weeks earlier than the 12th of April sowings.

Respectfully submitted,

P. J. SHAW.

PART 6—POULTRY DEPARTMENT.

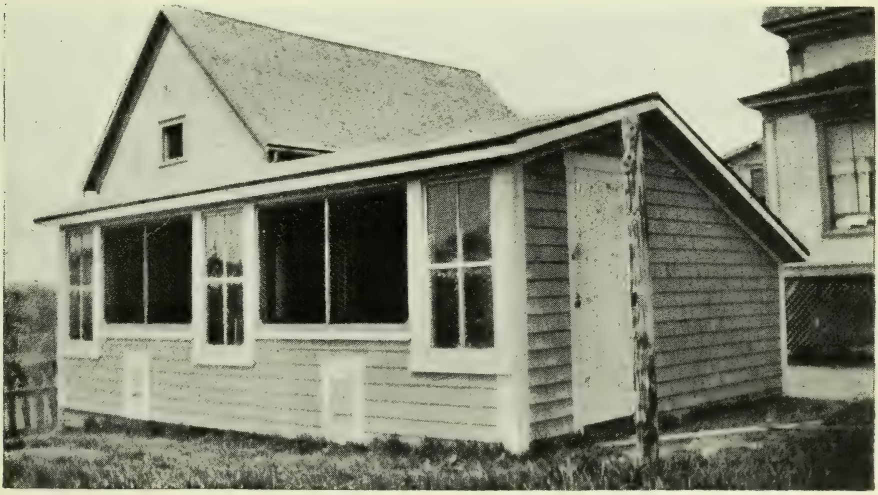
Prof. M. Cumming,
Secretary for Agriculture,
Truro, N. S.

Sir —I have the honor to submit herewith my 16th Annual Report as Manager of the Poultry Department.

This Annual Report would not be complete without a review of the situation which confronts every live stock owner and poultryman. The cost of feed has discouraged many from increasing their flocks and in the case of the small flock owner of the towns and cities the very high cost and scarcity of feed makes maintenance too expensive for a reasonable profit. Previous to the beginning of the war poultry feeds of good quality were obtainable at a price which gave a fair margin of profit to the poultryman. In 1914 corn, a staple poultry food, could be purchased for $1.75—$2.00 per one hundred pounds. During the past year this has been sold at $4.25—$4.85 per one hundred pounds. The price of eggs has not increased in the same proportion. The average price for one dozen eggs during the summer of 1914 was twenty-five cents. The average price during the past year was not above thirty cents, The winter price is higher for new laid eggs and they are harder to secure but this price does not compensate for the very high cost of the feeds. The only solution that I can recommend is the keeping of flocks of ten to fifteen fowls by each householder and using the table waste to form a large portion of the ration. By this plan each household could secure the eggs required at cost. The careful conservation of the spring and summer production for use during winter will also solve the problem of sufficient eggs for all persons. That this can be done has been demonstrated by the Co-operative Egg Circles.

In order to assist in the production of more poultry feed, this department assisted in securing about three hundred bushels of Buckwheat for seeding purposes. This was supplied to persons who made application and helped to fill in spare land, after all other crops were in the ground, to the very best advantage. During the fall the feed supply for poultry problem became acute and it was imperative that some cheap feed should be secured. The Dominion Department of Agriculture assisted us to obtain two carloads of feed which was placed in the trade and sold at an agreed price. This assistance proved timely and has been repeated again recently. The object of importing these

Rev. J. E. Robitaille of West Arichat, who acts as Agricultural Representative for the Dept. of Agriculture on Isle Madame, Richmond County, encourages poultry raising.



Demonstration Poultry House erected at Bridgetown, Annapolis Co., N. S.

car-loads of poultry feeds is to assist our farmers to hold over all the breeding stock for next spring in order that a large production may be affected next year.

College Poultry Plant.

During the past year we raised on the College Poultry Plant 670 chickens. The stock not required for to replace the old fowls in our pens was sold for breeders as heretofore. All the cockerels not required for breeders were sold early in the season as broilers at a record high price.

The Blue Hen Brooder purchased last year has continued to give satisfactory results. We continued to supply eggs for hatching to the schools of the Province and I submit herewith a list of the number of settings supplied during the past three years.

Eggs Distributed during 1915.

Barred Plymouth Rocks	219	Settings
White Wyandotts	167	"
White Leghorns	135	"
Brown Leghorns	54	"
Pekin Ducks	8	"
R. I. Reds	41	"
Black Minorcas	56	"
	680	"

1916.

Barred Plymouth Rocks	174	settings
White Wyandotts	128	"
White Leghorns	95	"
Brown Leghorns	28	"
Pekin Ducks	11	"
R. I. Reds	19	"
Black Minorcas	25	"
	480	"

1917.

Barred Plymouth Rocks	225	settings
White Wyandotts	187	"
White Leghorns	157	"
Brown Leghorns	68	"
Pekin	25	"
R. I. Reds	53	"
	715	"

The four pens of pullets selected last year were kept over and a record of the feed consumed and eggs produced was kept. The variations in the cost of feed during the different months is due to the fact that we were able to secure some feed at a little below the market price. The production this second year is not as good as the first year and confirms the opinion held by experienced poultrymen that the pullet year is the best year for egg production. A close study of the two record sheets gives in detail the results obtained.

30 *White Leghorn Hens* (2 *years old*).

	Cost of Feed	No. of Doz. Eggs	Price per Doz.	Amt.	Profit	Loss
January.......	$4.22	6	50c	$3.00	......	1.22
February......	3.20	9½	50c	4.75	1.55	
March........	3.51	26½	45c	11.92	8.41	
April..........	4.00	46	30c	13.80	9.80	
May..........	4.57	47	35c	16.45	11.88	
June..........	4.56	39½	35c	13.92	9.36	
July..........	5.27	36½	40c	14.60	9.33	
August........	5.49	27	45c	12.15	6·66	
September.....	5.44	14	50c	7.00	1.56	
October.......	4.50	8½	50c	4.25	.25	
November.....	3.63		50c			3.65
December.....	4.06	1	50c	.50		3.56
					58.80	8.83

30 *Barred Plymouth Rocks* (2 *years old*)

	Cost of Feed	No. of Doz. Eggs	Price per Doz.	Amt.	Profit	Loss
January.......	$5.45	1½	50c	$ .75		4.70
February......	4.40	7½	50c	3.75		·65
March........	4.49	17	45c	7.65	3.16	
April..........	4.53	41	30c	12.30	7.77	
May..........	5.38	30	35c	9.97	5.12	
June..........	5.04	28½	35c	9.97	4.93	
July..........	5.94	17	40c	6.80	.86	
August........	6.47	26	45c	11.70	5.23	
September.....	6.17	16	50c	8.00	1.83	
October.......	5.33	12	50c	6.00	.67	
November.....	4.13	4½	50c	2.25		1.88
December.....	4.99	½	50c	.25		4.74
					29.57	11.97

Egg Circles.

The egg circle at Pugwash Junction has continued to give service to the farmers in that vicinity. A ready market has been found for all that were collected. Fresh eggs were collected, stored in the tanks and sold during the months of November, December and January. A similar circle was organized at Bridgetown, Annapolis County which collected about three thousand dozen eggs this season.

During the early spring a tank was built at a point near the Margaree Creamery. The cream teams going their rounds collected the eggs which were stored and have been sold at a decided advantage to the farmers. The three circles have during the year handled fifteen thousand dozen eggs. Organization is about completed to start similar circles early next spring at Beaver Cove in Cape Breton and at Red Islands in Richmond County.

Meetings Attended.

During the past year, I addressed twenty-two meetings in different parts of the Province. The larger number of these meetings were held in Richmond and Cape Breton Counties for the purpose of organizing co-operative egg circles in these counties. Other meetings were held in Halifax, Pictou, Victoria and Annapolis counties.

Demonstration Houses.

Demonstration houses have been erected at the following places:—At Red Islands, Richmond County by Mr. J. J. Johnson, at Halifax, by The School for the Blind, at Windsor N. S., by The Freemason's Home, at Port Royal, Richmond County by Mr. Alban P. Poirier, at Bridgetown, Annapolis County by Mr. Fred E. Bath.

It is a pleasure to again refer to the good results which follow from the erection of a Demonstration House in any locality. At Bridgetown some fifteen similar houses have been erected after the plan of the one which was placed in that community. At Port Royal several houses were erected simultaneously by persons in the neighborhood, and at Halifax and Windsor the same interest was noticed. It is our intention to co-operate with the officials of the School for the Blind by holding meetings and conducting classes in Poultry Husbandry, suitable to the pupils of that institution.

Mr. John A. Archibald of Denver, Guysboro County, has been engaged to attend the fowls and although blind has demonstrated that this misfortune is not so great but that it can be overcome to some extent in doing this kind of work.

I have received a number of reports from the persons conducting the Demonstration Poultry Houses. Space does not permit of reporting all herewith but I wish to submit the report received from Mrs. Jas. Stoddard, Mount Denison, Hants Co. which is of special interest. It is submitted just as received from Mrs. Stoddard.

Report of 160 Barred Rock Hens kept by Mrs. Jas. Stoddard.

1000	doz. fresh eggs @ 40c	$400.00	
500	" preserved eggs @ 50c	250.00	
	Eggs sold for settings	8.25	
817	lbs. dressed chickens @ 30c	245.10	
300	day old chicks @ 15c each	45.00	
29	pullets 1.00 each	29.00	
6	" 1.25 "	7.50	
5	cockerels @ $2.00	10.00	
30	lbs. feathers @ 30c	9.00	
200	feed bags @ 5c	10.00	
80	bbls. droppings	80.00	
			$1093.85

Expenditure.

56	cwt. cr. corn, corn meal	$131.13	
41	" middlings	90.15	
18	" Bran	36.15	
10	" frosted wheat	30.00	
160	bus. oats @ 60c	96.00	
110	" " @ 95c	104.50	
90	lbs. roll oats	4.25	
10	cwt. beef scrap @$2.60	26.00	
30	bus. turnips @ 20c	6.00	

Necessaries.

2½	bbls. oyster shells @ 75c	1.88	
500	lbs. straw	2.00	
	Oil for incubation	5.20	
	Coal for brooding chicks	4.00	
	Water-glass for preserving eggs	2.50	
	Rent on land	35.00	
	Dep. houses	5.00	
			$580.76
	Total profits $513.09.		$513.09

The County Poultry Clubs.

The number of County Poultry Clubs organized under the Act of 1913 has increased. The following counties have an active organization and are doing very effective work in increasing the numbers and improving the quality of the poultry. Victoria County, Cape Breton, Richmond, Antigonish, Pictou, Colchester, Halifax, Kings, Annapolis and Cumberland. The counties of Hants and Yarmouth have organized clubs but during the past season have not held shows or re-elected officers. Some effective work has been done by the organized effort of interested poultrymen in these counties. The County of Guysboro is organized and some good foundation stock has been imported for breeding purposes which will help improve the quality of the poultry.

The following paragraphs give in detail the different county shows held under authority of the Act.

On January 16-17, The Richmond County Poultry Club held their second annual poultry show at Arichat. This show was a great improvement over the first effort and illustrated the possibilities of a little attention on the part of breeders to improving their stock by selection.

The officers are:—

President—Jas. D. Power.
Secy-Treas.—Rev. G. A. Andrew, Arichat.

On January 18-19 The Victoria County Poultry Club held their second annual poultry show at Baddeck. The weather interfered somewhat with the number of entries at this show but the interest shown was all that could be expected. It was decided to try and hold the next show earlier in the season. On November 19-20 the third annual show of this club was held in the hall at Baddeck and was a surprise to all who had the pleasure of visiting the show. Visitors to the show were surprised at the quality and numbers of good poultry shown. It is however a noticeable fact that the farmers do not take as much interest in the show as would be expected. A splendid agricultural district in the neighborhood of the show should be in position to have a much larger entry. The show was well conducted and competition was keen for the sweepstakes, silver cup donated by Hon. G. H. Murray.

The officers are:—

President—F. J. McFarlane.
Secy-Treas.—Douglas Fraser. Baddeck.

On February 6-7-8 The Annapolis County Poultry Club held their first poultry show in the new Agricultural Building at Lawrencetown. The exhibit of poultry was of good quality and bespeaks for the future a rapid improvement in this line of farm live stock. On this occasion the county club was honored by a visit from the Premier of the Province Hon. Geo. H. Murray who gave an address to a very large and appreciative audience. Each evening during this show speakers addressed the attending visitors on topics relative to the production of more and better poultry. An exhibit from the Dominion Department of Agriculture was placed in this show which attracted a good deal of interest. This exhibit illustrates the results from the proper and improper care of the flock in the amount of loss or profit which each method entails.

The officers are:—

President—Fred E. Bath.
Secy-Treas.—E. C. Shaffner, Lawrencetown.

On February 14-15-16 The Halifax City and County Poultry and Pet Stock Association held their first show. This show was open to the Maritime Provinces and the prizes offered induced a great many outside exhibitors to show their fowls. It was the best collection of high grade poultry at any one show of our provincial circuit for the season. The officers worked hard and their efforts were very successful in that the exhibit attracted a great deal of attention from the general public. On December 4-5-6 the same club held a show in the Market Building at Halifax which has not been equalled in the Maritime Provinces as to quality and numbers. A large number of silver trophies, a phonograph and a sweepstakes prize of a 20th Century Piano together with a large number of smaller special prizes made up a prize list which has not been equalled anywhere in Canada, and at but very few shows in any country. The quality of the stock exhibited was the best to be had. A number of the best breeders, in order not to be outdone imported stock at big prices from Ontario and the United States which will be used the next season for producing the winners at future shows. This will result in a great improvement to the poultry stock of the Province. The great disaster which occurred at Halifax on the morning of December 6th, brought this successful show to an abrupt ending. The building in which the show was held was badly racked but not one of the fowls were injured. It was several days before the birds could be shipped to their owners but we were able to ship them to the owners without the loss of a single bird. It is my intention to secure a complete list of all the exhibitors at this show for a breeders directory to be used during the spring breeding season.

The officers of this show deserve all credit for the success they have achieved. The importations of improved stock will do much to build up the quality of poultry in this Province.

The officers are:—

President—E. S. Tracey.
Secy-Treas.—C. F. Bowes, Halifax.

On November 23-25 The Glace Bay District Poultry and Pet Stock Association held their fifth annual show in Alexander Rink, Glace Bay. The poultry exhibited here has improved each year in quality and numbers. The scarcity of feed and the higher price of what is offered has had the effect of discouraging some from going into the production of poultry on as large a scale as they otherwise would like to do in this district. The members are not discouraged but have co-operated for the purpose of buying all their feeds and thus are able to make the best of the unfavorable situation.

The officers are:—

President—William McKinnon.
Vice-Pres.—Carl Hoare.
Secy.—W. T. Mattinson, Glace Bay.

On November 27-29 The Cumberland County Poultry and Pet Stock Club held their first show in the curlers rink in Amherst. The show was a success and much credit is due to the officers who worked hard to get this first show organized.

The officers are:—
President—C. B. Chapman.
Secy-Treas.—V. G. Fuller, Amherst.

The Antigonish County Poultry Club had selected dates for their show which was to be held on December 13-15, but owing to the disaster at Halifax, transportation could not be secured for the coops and this show was postponed It is likely to be held in the early part of the coming year.

The officers are:—
President—Wm. Simpson.
Vice-Pres.—A. A. G. Stronach.
Secy-Treas.—Thomas F. McDonald, Antigonish.

The Kings County Poultry Club are preparing to hold their show this year at Wolfville and indications point to a very good exhibit of fowls at this show.

The officers are:—
President—Ernest Craze.
Vice-Pres.—E. J. Armstrong.
Secy-Treas.—Warden Plant, Kentville.

The Egerton Poultry and Pet Stock Association are planning to hold their show this winter at Westville. The difficulty of securing feed of good quality at a price which is not unreasonably high has had a marked effect on the members of this club. A great many have had to give up the keeping of fowls and have become discouraged but others have been able to carry on and are as enthusiastic as ever under such adverse conditions.

The officers are:—
President—John Higson.
Secy.—Samuel Moss.
Treas.—Howard McKenzie.

On April 20th, a number of the poultrymen of Colchester County met at Truro and organized a county poultry club. A prize list is now being mailed for the first show of this club to be held at Truro, on January 2nd, 3rd, and 4th, 1918. Several handsome silver cups have been received as donations to the prize list, besides a large number of articles of value have also been offered. The prospects are very good for a successful show and one that will assist to renew interest in the industry.

The officers are:—
President:—Lou J. Walker.
Vice-Pres.—W. J. McKinnon.
Secy:—John McMullen.
Treas.—L. C. Harlow.

During the time of the Guysboro County Exhibition the poultry exhibitors there decided to organize a county poultry club. A silver cup has been received for competition and prospects look bright for an awakening of interest in the industry in this county.

Mr. A. B. McDonald, District Representative of the Department of Agriculture is acting secretary for this club until complete organization is effected.

The Nova Scotia Poultry Association Meeting.

The fifth annual meeting of the above Association took place at the Agricultural College, Thursday, January 11th, 1917.

Representatives were present from nearly all the different clubs of the Province. A report from each delegate was submitted to the convention.

The report from the Glace Bay and District club complained of the unsatisfactory condition of the exhibition building for poultry at the Sydney exhibition. The matter was placed in the hands of the Secretary to have letters drawn up and protests made to the exhibition commission and to the Secretary for Agriculture.

The resolutions passed last year were re-affirmed and it was again suggested that a letter should be sent the trade re exposing eggs in store windows. It was also suggested to have a letter issued re removing the cock bird at the close of the breeding season.

It was also decided to ask the Dominion Department of Agriculture to assist with their educational exhibit at all poultry shows held under the direction of the Association. The question of providing funds for the smaller shows was discussed and it was decided to apply to Mr. W. J. Black, Commissioner of Agriculture, Ottawa for permission to use some of the funds for paying prizes at these shows.

A long discussion followed in re organization of a laying contest but it was decided to put the matter off for the present owing to the war and other more pressing needs.

The Secretary was instructed to secure all the information possible on the subject and have it presented at the next meeting in order that the methods adopted by the different competitions could be examined and reported upon.

Other matters of interest were discussed by the meeting and much information of value to poultrymen was presented for consideration.

The officers elected for the year were:—
President—Fred E. Bath, Bridgetown.
Vice-Pres.—E. E. Frehill, Antigonish.
Executive Committee:—
W. F. Mattinson, Glace Bay, Frank E. Jackson, North Sydney, C. F. Bowes, Halifax, N. S., W. W. Osborne, New Glasgow, H. M. Pettet, Yarmouth, Thos. F. McDonald, Antigonish.
Secy-Treas.—J. P. Landry, Truro, N. S.

Exhibitions Attended.

The following exhibitions were attended at which I acted as judge of the Poultry exhibits:—Inverness, Shubenacadie, Yarmouth, Bridgewater, Digby, Arichat and Guysboro. At the last named exhibition the improvement in quality was remarkable and as stated elsewhere in this report, plans were made for further improvements in the county. The assistance of Mr. W. H. Henry, Shubenacadie, N. S. was obtained for judging at several exhibitions and county poultry shows.

At the Yarmouth Exhibition, the Demonstration Two Pen Farm Poultry House was erected and exhibited during the days of the show. This house was visited by a good many persons and bulletins were forwarded to all who requested that they be sent.

I regret to report that a satisfactory arrangement was not completed with the exhibition management at Sydney in regard to the unsatisfactory building for the poultry exhibits. The exhibition of poultry was not representative of the quantity and quality of the district owing to this neglect on the part of the management to make needed repairs.

It is again a great pleasure to record my appreciation of the hearty co-operation of one and all the officers of the different county poultry clubs. I have received many evidences of kindly interest in the success of the work wherever I have gone which is very encouraging for the future. The only difficulty in the way of an abundant production of poultry and eggs is the solution of the feed production problem. In time, I hope to see this difficulty overcome and the people of this Province can and will produce all the poultry and eggs required.

I wish to again record my appreciation of the faithful and satisfactory manner in which Mr. Dan. McInnis has conducted the work at the College Poultry Plant. The records of all shipments of eggs and incubation of chickens have been carefully kept. The student practice work in poultry has also been under his direction and has proven very satisfactory.

I wish also to thank you for continued interest in the work under my care in different parts of the Province. Your interest in the solution of the more difficult problems in connection with the work is very much appreciated.

All of which is respectfully submitted.

J. P. LANDRY.

PART 7—REPORT OF THE SUPERINTENDENT OF DAIRYING.

Prof. M. Cumming,
Secy. for Agriculture,
Truro, N. S.

Sir:—I beg to submit herewith my sixth Annual Report in connection with the dairy business in the Province.

General.

In former years efforts were made toward organization work and development in new territories, where dairying had not been carried on to any extent. This past year, my efforts were directed more toward the creameries in existence with a view to having a higher quality of butter put on the market, rather than an increased quantity. To do this necessitated some changes in nearly all of the plants in operation and consequently required more time spent in the creameries, leaving less time for outside work.

During the past years, the inspection and instruction work was largely delegated to the Asst. Dairy Supt. but for the last two years, due to the enlistment of the Asst. Supt. I have endeavored to do this work myself. However, with the multiplication of other duties, it appears at present impossible for me to keep up with the work and consequently, I feel that in the best interests of the business, I will have to have more help during the coming year.

Twenty-two creameries were in operation during the year, being one more than in 1916. The Musquodoboit Creamery was bought during the season by Messrs. Waddell and Beck, refitted and re-opened about the middle of July. As the attached report will show, they have had a very successful beginning.

The Economy and Bass River Cheese & Butter Co. sold their plant to Mr. G. B. Creelman, who had the building overhauled and a new churn, vats, floors and other equipment added, putting the creamery in good shape and worthy of the patronage of the milk producers in that section.

In many of the other factories considerable improvement was made, chiefly in the introduction of pasteurizing, self agitating vats and in the employment of more scientific methods in manufacturing and a more skilful use of the "Acidimeter" and the "Moisture Test," which enabled them to place on the market a more uniform quality of butter. These improvements can be partially attributed to the work of the Dairy School and partially to the increased output which demands a higher quality and partially to the adoption of cream grading.

Cream Grading.

Cream Grading was carried on in a number of the creameries during the year on the grades as defined in last year's report and no doubt is doing a lot to better the quality and as the demand for butter becomes more exacting, more of the creameries will adopt this system. No definite statistics were compiled during the year as to the per centage that was graded but this will be undertaken during the coming year.

Grants.

The usual grants were made to new creameries during the year and in some cases some special assistance was given.

Butter Scoring Competition.

A Butter Scoring Competition was carried on during the summer months under direction of the Dairymen's Association, funds for the same being provided by the Department of Agriculture and contributions from Smith & Proctor, Halifax, and DeLaval Supply Co., Ltd.

Sixteen creameries entered the Competition and the rules required that each competitor send a 14 lb. box of butter to the Cold Storage in Halifax, during each of the five summer months. This butter was to be sent within 48 hours after the receipt of a telegram from the Secretary and the Competitor was required to sign a statement that the butter was of the average make. This butter was given a preliminary scoring and will be finally scored separately by three judges just previous to the Annual Convention. The object being to ascertain the keeping quality of the general run of butter made. This will be more fully reported in the separate report of the Dairymen's Association.

Meetings.

During the year I attended the Annual Meetings of a number of the creameries; picnics at two creameries, one at Bridgewater on July 10th and the other at Lower South

River on July 12th; and about 25 other meetings in connection with the different creameries in the Province.

A series of meetings was also held in Cumberland County during October, with the object in view of organizing one central creamery in the County, with headquarters at Amherst. A public meeting was held and a committee appointed to carry out the work. After a number of meetings, it was decided to defer the organization until June of the coming year, due to the many demands on the people at the present time.

At the invitation of the New Brunswick Department of Agriculture, I addressed a number of meetings in Albert County in the interests of organizing a central creamery in Moncton.

Meetings in different parts of the Province were also addressed by Mr. D. W. Murray, President of the Dairymen's Association.

Dairy School.

For the first time in the history of the College, a Dairy School was held for the benefit of the Cheese and Buttermakers of the Maritime Provinces. This might be termed a Maritime Dairy School in so much as it was carried on jointly by the Departments of Agriculture of the three Provinces, each sharing equally in the overhead expenses in connection with the school and the College here supplying the building, plant and machinery. About $2500.00 worth of new machinery was added to the equipment of the dairy for this purpose.

The Course was divided into a two weeks course in buttermaking from March 7th to March 21st. and a course in cheese making from March 22nd to March 30th.

The chief instructors outside of the College staff were ae follows: Cheese making, Mr. George H. Barr, Chief of ths Dairy Division, Ottawa, and Mr. F. T. Morrow, Cheese Instructor for Prince Edward Island· Buttermaking, Mr. Mack Robertson, Manager of the Belleville Creamery Limited and a former instructor in Western Ontario; Milk Testing, the late C. W. McDougall, Dairy Superintendent of New Brunswick; Cream Separators, Ben Gallant, St. Louis, P. E. I.

A total attendance of 41 was enrolled in the four weeks, Nova Scotia supplying 20, Prince Edward Island 19, and New Brunswick 2.

The course throughout was of a practical nature and the results are noticeable in a more uniform quality of cheese and butter made and more scientific methods employed to overcome the losses that are bound to creep in.

A similar course is being arranged for the coming Spring the dates set being March 13th to April 4th, and it is hoped that this will be an annual affair in the future.

There is much apparent need for more advanced dairy education in the Maritime Provinces, not only among the creamery and cheese factory men but among private dairymen as well. It is hoped that with the co-operation of the three Maritime Provinces the beginning made at the Dairy School can be developed along proper lines and, as soon as consistent with other demands, plans formulated for the erection of a suitable up-to-date dairy building in connection with the College of Agriculture here, where a Maritime Dairy Course could be put on not only for experienced men but also a fuller course for those beginning to learn the business. This would appear to be the most practical way of getting the desired results and it is evident that there is at the present time a growing demand for such a movement.

Government Creameries.

The creameries at Baddeck and Margaree were again operated during the season by this Division. Attached to this report will be found the reports of the Managers and statements of the assets and liabilities. The accounting was done through this office and was attended to by Miss Caldwell.

Although there is quite a deficit showing this year, the work appears to be well worth while and while at Baddeck especially not as much progress was made as was hoped for and a large portion of the people in the district have not yet realized the value of a creamery, still it is apparent that results are being obtained and the men who have stayed with it from the start are becoming object lessons to their neighbors, which, it is hoped, will soon induce them to also participate in the advantages of co-operative dairying.

In the spring I arranged to put an outside man in these two districts to work along the line of herd improvement through the medium of the Cow Testing Association, and engaged Mr. Sutherland for the work. Owing, however, to the fact that we could not engage a suitable manager for the Baddeck Creamery, Mr. Sutherland had to remain there during the season, but if this work can be developed, it will be the means of putting these two creameries on a sound financial basis and of bringing equal prosperity to the patrons.

Dairymen's Association.

The Annual Convention of the Dairymen's Association will be held at the Agricultural College, here on the 10th and 11th of the present month.

The directors this year decided to have the report published separately and in sufficient quantity to supply one to each creamery and cheese factory patron in the Province. This report will be out by the 1st of March and will be available for free distribution by applying to this office.

Statistics.

The statistical reports of all the cheese factories and creameries will be found as a part of this report. This report shows an increase over 1916 of 398 patrons supplying milk and cream; an increase of 174,192 lbs. butter, of an increased value of about $150,000, or a total output of $706,899.24 as compared with about $45,000 in 1907, ten years ago.

While these figures may appear as though great progress had been made, it is still very insignificant in comparison with the possibilities of the Province, where ten times the present amount would still be small as compared with what might be done. Whether we can ever reach this goal or not is problematic. But we have at our command the natural facilities of a country which seems to be endowed with all the requirements necessary to make the dairy business a success and when the day of readjustment and reorganization of the resources of the Province comes, it appears as though it will be up to this Department to devise ways and means to bring about the prosperity of the dairy business that it so richly deserves.

Appreciation.

My personal appreciation is due to all who in one way and another have co-operated with me during the year to make my efforts effective; especially to the Dairy Division of the Department of Agriculture, at Ottawa, their Maritime Representative, Mr. Mitchell and also the Dairy Recorders in the Province, and to Miss Caldwell, the able and obliging Secretary and stenographer of the Division who relieved me of very many responsibilities to which I would otherwise have had to give my personal attention.

Respectfully Submitted,

Dated at Truro,
Jan. 2, 1918.

W. A. MacKAY,
Dairy Superintendent.

REPORT OF CHEESE FACTORIES AND CREAMERIES FROM DEC. 1, 1916 TO NOV. 30, 1917.

County	Registration No.	Name of Cheese Factory or Creamery	Name of Prop. Pres. or Secy.	Name of Manager Cheese or Butter maker	P. O. Address	No. of Patrons.	Total lbs. milk Received	Total lbs. Cream Received	Total lbs. Cheese Made	Total lbs. Butter Made	Quarts Ice Cream Made	Quarts Sweet Cream Sold	Value of Business Done	Spent in Improvements
Annapolis	1	Lawrencetown C. &. B. Co	A. W. Clark	J. B. Jefferson	Lawrencetown	95	....	190118	.....	53785	.....	......	$18724.75	$ 200.00
Antigonish	2	South River Creamery Co.	D. R. Henderson	T. A. Chisholm	Loch Katrine	210	....	*240900	.....	26434	.....	......	32120.00	700.00
"	3	Milburn Creamery Co.	L. A. Gillis	H. A. McDonald	Malignant Cove	163	....	130756	.....	32000	.....	......	12050.00	10.00
"	23	Antigonish Dairy Co	J. C. Chisholm	J. E. Falt	Antigonish	200	196680	251212	.....	43307	.....	48100	35213.60	1600.00
"	24	Intercolonial Cry. Co.	R. Fraser	A. Cameron	South River Sta.	238	5862	232414	.....	80903	.....	9651	31626.14	853.00
"	Permit	Marydale Cheese Factory	Geo. Vinten	Dan McDonald	Marydale	20	191100	....	17200	....	.....	......	3600.00	....
"	"	Glassburn Cheese Factory	"	John Fraser	Glassburn	11	68050	....	5772	....	.....	......	1100.00	....
Colchester	4	Brookfield Creamery Co.	R. B. McLennan	W. L. Brenton	Brookfield	130	57101	336943	.....	55053	770	69520	48706.43	660.00
"	.5	Economy & Bass River C. and B. Co	G. B. Creelman	G. B. Creelman	Little Bass River	30	52560	62540	.....	16480	.....	346	6894.00	500.00
"	7	Great Village Creamery	T. D. Blaikie	T. D. Blaikie	Great Village	80	....	151809	.....	40561	.....	20000	25965.60	600.00
Cumberland	8	Cum. Co op. Cry. Co	R. L. Rutherford	W. A. Landels	River Hebert	97	....	184563	.....	53741	8572	240	23093.17	....
"	20	Malagash C. & B. Co. Ltd.	J. T. Treen	H. H. Gillis	Malagash R. R. I.	33	487495	....	45239	....	.....	......	9638.44	....
Digby	9	Clare Creamery Co. Ltd.	E. U. Doucet	L. C. LeBlanc	Meteghan River	130	....	64507	.....	22000	.....	......	8100.00	800.00
"	10	La Societe d'Industrie Laitiere de Meteghan Ltd.	L. Robichaud	N. Roberge	Meteghan	71	333215	....	.....	18178	.....	265	6945.30	950.00
Hants	11	Bayview Creamery Co.	A. M. Anthony	Douglas Neal	Stirling Brook	150	....	273000	.....	91000	.....	......	40000.00	....
Halifax	..	Model Creamery	H. A. Beck	E. Blaikie	Mid. Musquo	125	....	79302	.....	26434	.....	......	11927.47	4000.00
Inverness	22	Margaree Creamery	N. S. Dept. Agr.	J. R. Sweeney	Margaree Forks	148	....	109639	.....	34159	.....	2	13574.21	....
Lunenburg	12	LaHave Creamery Co., Ltd	C. R. DeLong	J. D. McKenzie	Bridgewater	700	....	774058	.....	253459	14693	1253	106489.36	350.00
Kings	13	Acadia Dairy Ltd.	C. R. H. Starr	A. M. Wheaton	Wolfville	225	20000	400000	.....	110057	2000	2000	45322.80	....
"	14	Acadia Can. & Cry. Co.	G. R. Toole	G. R. Toole	Kingston	12	....	52000	.....	15470	.....	......	6188.00	....
"	15	Fairview Creamery	Illsley Bros	F. A. Illsley	Berwick	95	....	*66000	.....	22000	.....	......	10000.00	....
Pictou	16	Scotsburn Cry. Co. Ltd.	J. G. Proudfoot	R. T. Stewart	Scotsburn	558	....	1437610	.....	380259	.....	......	148193.42	1600.00
"	17	Pictou Co. Dairy Co. Ltd.	D. McDonald	H. Falconer	Stellarton	391	....	360118	.....	116289	.....	2500	60000.00	985.00
Victoria	18	Baddeck Creamery	N. S. Dept. Agr.	J. R. Sutherland	Baddeck	107	....	107451	.....	35052	.....	......	14040.44	....
Yarmouth	19	Yarmouth Creamery Ltd.	F. E. Porter	F. E. Porter	Dayton	325	....	662702	.....	190384	.....	*9358	86386.21	500.00
						4289	1861762	6074642	68231	1760871	26035	163235	706899.24	14308.00

*Estimated

Manager's Report.

Baddeck, N. S.,
Dec. 1, 1917.

Mr. W. A. MacKay,
Dairy Superintendent,
Truro, N. S.

I herewith submit my fourth Annual Report as Manager of the Baddeck Creamery.

The creamery opened May 1st with fairly good prospects. The make of butter was hindered, however, by the cold weather during May aad June. During the rest of the season there was excellent weather for grazing, upon which the farmers depended entirely for production of milk.

The output was somewhat disappointing coming slightly below that of last season. Although it appears that the creamery has declined in the past two years, in reality it has only been getting down to a sound basis. In the past cream was received from districts were, owing to the lack of proper transportation, the service was unsatisfactory to the patrons and they were obliged to discontinue sending to the creamery. It is quite clear that such places which were heretofore considered within reach of the creamery cannot be taken into consideration. The districts with proper transportation facilities have made a decided increase in the quantity of cream.

Production needs still further encouragement; although some patrons have increased production of milk, others have shown a decrease. I have tested the individual cows of five patrons throughout the season. If this work is followed up and studied intelligently, it will have a very beneficial result.

The outlook for next season is very encouraging although I do not look for a decided increase until the patrons take a more whole hearted interest; show a greater spirit of co-operation, and feel that the destiny of the creamery lies in their own hands and not with the Department of Agriculture.

In conclusion I wish to thank yourself and all others for the kind assistance given me during the past season.

Respectfully submitted,

J. R. SUTHERLAND.

BADDECK CREAMERY.

Capital Account.

Plant and Equipment as per last statement	$6592.16
Receipts from Sale Ice Cream Machinery	130.00
	$6462.16

STATEMENT OF ASSETS AND LIABILITIES DEC. 31, 1917.

Assets.	
Plant and Equipment	$6462.16
Inventory, Capital Account	59.38
" Current Account	267.62
Outstanding Accounts (Good)	195.39
Excess of Liabilities over Assets	2180.17
	$9264.72

Liabilities.	
Dept. of Agr. Plant & Equipment	$6462.16
Dept. of Agr. for sale of ice cream machinery	130.00
Dept. of Agr. on current account including interest on Cap. Acct. to Jan. 1 1917	1681.74
Dept. of Agr. years interest on Cap. Acct. $6592 16 at 5%	329.60
Dept. of Agr., Deficit of 1914, 1915 and 1916	413.09
Balance Cash Account	62.10
	$9264.72

NOTE.

The liabilities on Dec. 31, 1916, were $1407.87 greater than the assets. On Dec. 31, 1917, they were $2180.17 greater, leaving a loss on year's trading of $772.30 including interest on Capital but not on balance on current account. Not including any interest, the net loss on the year's trading would be $442.70

The loss is much higher than in former years, due to the fact that all kinds of supplies are much higher than under normal conditions and the charge for manufacturing that was set in 1913 has not been advanced. To put the business on anything like a par with advancing prices an additional charge of 1c per pound for manufacturing will have to be charged for the coming season. This would be an advance of less than 30% while the price of butter has advanced over 50%.

Manager's Report.

Ontario Agricultural College,
Guelph, Ont.
Dec. 18, 1917.

To W. A. Mac Kay,
Dairy Superintendent,
Truro, N. S.

Sir:—I beg to submit my report as Manager of the Margaree Creamery for the season of 1917.

The Creamery opened for business on April 30th and closed on Nov. 3rd, and I am pleased to report a marked increase in the number of patrons and a corresponding increase in the output of butter, During the season we had 148 patrons and produced 34000 lbs. of butter as compared with 116 patrons and 24000 lbs. of butter in 1916. This increase of 45% is very encouraging when we consider that the Spring of 1917 was very backward and a scarcity of feed was general throughout the Valley.

Cream haulers were employed on the same routes as the previous year with general satisfaction to the patrons, and several sections have asked for additional teams but on account of the deficit on the main routes, I would not suggest adding more teams without raising the charge for this service.

The quality of cream received showed improvement over the first year and this improvement in quality is due to "Cream Grading," which encourages the patron to send only cream that will grade number one.

The creamery has made a very successful start and its benefits are appreciated by the majority of patrons who openly express their entire satisfaction with its returns so far. The final success depends upon the development of the production end and I am pleased to report that already a number of high class dairy sires have been purchased in the Valley and patrons are paying more attention to the growing of roots and summer feed for their cows.

A feature of the season's work was the beginning of individual herd testing and while the time at the disposal of the creamery man is not sufficient to carry on this work as it should be done, we did all we could to make a start and a number of patrons kept records and tested throughout the season and with the interest aroused, I think the time is not far distant when a man will be required to take charge of this important work of herd improvement.

In bringing this report to a close I would again repeat that Margaree Creamery is slowly but surely stimulating the farmers to a realization of their opportunities and if that interest and co-operation continues, the success of the creamery is assured and prosperity will reward those who have supported it from the beginning.

I would like to express my thanks to you, as Dairy Superintendent, for your interest in my work and your assistance given me at all times. I also wish to thank the people of Margaree for their co-operation with me and for many kindnesses accorded me during the season. Special credit is due to my assistant, A. J. McDaniel, who had charge of the creamery and carefully carried on the work during my absence in September and October.

Respectfully submitted,

J. R. SWEENEY.

MARGAREE CREAMERY.

Capital Account.

Cost of Plant and Equipment	$5476.98
Still Owing	30.00
	$5506.98

STATEMENT OF ASSETS AND LIABILITIES DEC. 31, 1917.

Assets.		Liabilities.	
Plant and Equipment	$5506.98	Dept. of Agr. Plant and Equipment	$5506.98
Inventory Capital Account	27.06	Dept. of Agr. Balance on Current Acct	869.84
Inventory Current Account,	288.09	Dept. of Agr. Deficit 1916 Acct	517.14
Outstanding Accounts	93.62	Dept. of Agr. Year's Interest on Cap. Acct	275.35
Balance on Cash Accounts	219.15	Dept. of Agr., Ottawa Cold Stor. Bonus	100.00
Excess of Liabilities over Assets	1494.32	Outstanding Accounts	359.91
	$7629.22		$7629.22

Note.

The liabilities on Dec. 31, 1916, were $792.49 greater than the assets. On Dec. 31, 1917, they were $1494.32 greater than the assets, leaving a loss on the year's trading of $701.83, including interest on Capital but not on balance on Current Account. Not including any interest, the net loss on the year's trading would be $426.28.

The loss is higher than it would be under normal conditions. The price of 4¼c for manufacturing was based on normal prices for supplies, which have advanced from 50% to 100% in the last two years. To put the businness on anything like a par with advancing prices, an additional charge of 1c per lb. for manufacturing will have to be charged for the coming season. This would be an advance of less than 25% and the price of butter has advanced from 25% to 50%.

Report of Wheat and Cereal Mills.

Prof. M. Cumming,
Secy. for Agriculture,
Truro, N. S.

Sir:—I beg to submit my third Annual Report in connection with the Government Cereal Mills.

Baddeck Mill.

This mill is on its third year of operation, with the following results in wheat milling:

For Season	1915-16, about	400 bushels
" "	1916-1917 "	5000 "
" "	1917-1918	a fair conservative estimate at the present time would be about 12,000 bu. wheat.

The mill does not claim the credit for the increase in the amount of wheat grown in the section during the last two years, but it is apparent that, if the mill had not been erected by this Department, the growers would have experienced considerable difficulty in getting the wheat milled and the efforts of the representatives in Cape Breton could not have been nearly as effective as they have been.

During the season of 1916-17, a small 25 bbl. mill was used and the work was handicapped for want of capacity due to the fact that the larger portion of grain comes by boat and as navigation closes about Dec. 31st, the bulk of the milling is done by that time. For that reason, the mill was replaced by a 60 bbl. mill during the summer and as addition of about 20 x 40 ft. built to the mill building. In spite of this, the miller has experienced the same difficulty this year and the only means I can suggest to overcome the trouble is to make provision for running the mill almost 24 hrs. daily during the rush season next year.

To lower the cost of milling, a kerosene attachment was put on the gasolene engine and the mill is now being operated by kerosene at a considerable saving in fuel.

The customers continue to express keen satisfaction in the quality of flour turned out. Considerable educational work has been carried on along the lines of selecting, growing and preparing wheat for milling in order to give the best results. This is the important feature from a miller's standpoint as it is no more reasonable to expect a miller to turn out finest grade flour out of second grade wheat than it is to expect finest butter out of poorly kept cream.

The buckwheat unit is giving the best of satisfaction as is also the feed mill, but the oatmeal mill to date cannot be run economically enough to give satisfactory results all around.

As long as the mill is owned by the Department, difficulty will be experienced in making it a profitable industry for the owner due to the fact that it cannot reasonably enter into general trading in flour and feed and consequently will be deprived of the margin of profit which might be thus secured.

Inverness.

During the year, the Department built a flour and feed mill at Inverness. This mill is not yet in operation but will be in the course of a few weeks. This will serve a long felt want over the Inverness Railway out to the Margarees and as far north as wheat can be grown in Inverness County.

Guysboro.

The Department, through the District Representative, Mr. A. B. McDonald, has supplied the machinery for a flour and feed mill at Boylston, in Guysboro County. This is now in operation and giving good satisfaction.

Respectfully submitted,

W. A. MacKAY.

PART 8—REPORT OF THE CHEMISTRY DIVISION.

M. Cumming, B. A., B. S. A.,
Secretary for Agriculture,
Truro, N. S.

Sir:—I have an honor in submitting my Fifth Annual Report of the Chemical Department of the Agricultural College.

At the present time, chemistry plays a decided part in placing agriculture where it should be, that is on a solid foundation, one foot on practical experience, the other on science. The more these are related the better the type of agriculture.

Having been asked to have a general care of the new science building, it is fitting to state that, while it is difficult to procure efficient janitorial service for such a building as this, everything as heating system, scientific equipment, etc. is in good condition. With few slight exceptions, the building and fittings are giving great satisfaction and we find it a pleasure to carry on our work in such surroundings.

Under pre-war conditions much more equipment would be needed for fitting up a new building but on account of the stress of the times, much care has been exercised in buying supplies, only the most necessary material being ordered.

Mr. J. G. Archibald as assistant chemist has done efficient work for which I wish to express my appreciation. A large part of the analytical work, and of this report, the sections on "Feeding Stuffs" and "Stewiacke Soils" have been prepared by him.

The work of the year is considered under the following heads:—

A. Instruction.
B. Analysis.
C. Investigation.

Instruction.

The classes at the College during the term from Nov. 1 to April 10, take about one half of my time. The work of the students in the various courses has been quite satisfactory; it is our effort to make such courses assist the student in his appreciation of the problems considered in their courses in soil fertility, stock feeding, spraying, etc.

While Chemistry does not appeal to short course men, a special effort was made last year to discuss informally the chemistry of the soil, of native fertilizers, and of the methods of maintaining soil fertility. This work, although carried on after the regular class periods of the day, was very satisfactory.

In March assistance was given the Dairy Department with four lectures on the chemistry of butter, cheese and water and some laboratory for the special course for butter makers. This work was repeated in the course for cheese makers. Further assistance has been given that department in making up and sending out standard acid and alkali solutions to various creameries in the Maritime Provinces and Newfoundland.

This department thought it advisable this year to arrange an exhibit for educational purposes at the Halifax exhibition. One month was spent arranging samples of soil, fertilizers, native and imported, charts to illustrate comparative yields, from different soil treatment; pot experiments to illustrate the effect of limestone on legumes. The display succeeded in its purpose namely in provoking enquiry and discussion since a large number of amateur gardeners as well as progressive farmers visited the booth and got some information. Such work should serve a useful purpose at the county exhibitions.

When collecting samples in any community an effort is made to discuss with as many farmers as possible, the soil and fertilizer problems of the locality. In this way, the work of the College is brought to the door of the people. Finally instruction by addresses, circulars and correspondence reaches others in different parts of the Province. While a large part of the Chemist's time is spent getting information by the slow process of analysis, yet we try to circulate such information as widely as possible.

B. Analysis.

During the year 400 samples have been analyzed more or less fully. This was followed by correspondence explaining as fully as possible the meaning of the analysis. These materials are classified as follows:—

No. of section.		No. of samples.
1.	Water	15
2.	Feeding Stuffs	21
3.	Insecticides	8
4.	Fertilizers	28
5.	Soils complete analysis	50
6.	Lime requirement of soil	159
7.	Muds and peaty soils, complete analsis	15
8.	Marls	23
9.	Limestone	77
10.	Miscellaneous	4

Section 2—Feeding Stuffs.

Next to the question of fertilizers the problem of most importance to the present day farmer is the economic feeding of stock. How to get the greatest possible gain from every pound of feed and what feeds does it pay best to buy; these are the questions which are put up to us from day to day. The answer to the former should come rather from the expert stockman than from the chemist so we will confine ourselves to the latter phase of the subject.

Before proceeding further permit us to state that the answer we feel like giving, to such a question would be, "Don't buy any and you will be playing safe." It is a deplorable fact that the farmers of Nova Scotia depend to a great extent upon Ontario and the West for their "short feed." When such a state of affairs exists there must be something sadly wrong with our system of farming. There is no valid reason why the average Nova Scotian farmer cannot be just as self sufficient in the matter of stock feeding as his Ontario friend, and the sooner we can break away from the enormous feed bill which eats up all our cash, and make our own acres produce enough to winter our stock, the better off we will be.

However, no amount of moralizing on our part will do away with the facts as we find them today. All we can do is to make the best of the situation by an honest endeavor to educate the rank and file to such a point that they will be able to interpret intelligently the guaranteed analysis of the various feeding stuffs on the market and so put a proper valuation on the same. Also in these days when the scarcity of food is a serious matter we would like to bring people to an appreciation of the value for feed of many of our by-products hitherto wasted.

With this end in view this department will analyze free of charge any and all samples of feed and feeding stuffs sent in by Nova Scotian farmers and will give a report on the same, and what information it can, in the course of a few days. Samples sent must be taken according to directions furnished by the department.

It is unfortunate that in the valuation of feeding stuffs we have no standard prices to guide us such as we have in rating fertilizers. If some definite standard could be adopted whereby we would pay so much per unit for protein and fat and whereby so much could be deducted for every per cent of fibre present, then the matter would be very much simplified. But such is not the case and as a consequence we find on the market feeds selling as high as, or even higher, than other feeds which are much superior in feeding value to them.

For the benefit of those who are at a loss to interpret analyses of feeds the following general statements apply to all mill feeds and all common home grown crops;

1. The higher the protein and fat in a feed within reasonable limits, the more valuable it is.

2. The ash content is of importance, as all animals, especially young stock, need an abundance of mineral matter.

3. Feeds having a high content of fibre are undesirable. The energy required to digest the fibre uses up good food which should go for either body up-keep or production of milk, meat, or, in the case of the horse, work.

4. Too much water in a feed lowers the percentage of total dry matter and consequently of the valuable constituents of the feed. The exception to this is in the case of such feeds as turnips and silage which are valued chiefly for their succulence.

5. The narrower the nutritive ratio the better the feed, e. g. a food balancing at 1:5 is superior, other things being equal, to one that balances at 1:6.

6. In putting a valuation on feeds their value as fertilizer after passing through the animal body must not be lost sight of. Of two feeds equally good for a certain class of stock, the one to buy would be the one which contains the greater amount of fertilizing elements, even if it be slightly higher priced.

Bearing these facts in mind let us consider the results of analysis of feeds made by this department during the past year and draw what conclusions we can from the figures

In all some 26 samples have been completely analyzed. This number consisted of:—

Wheat	4 samples.
Wheat middlings	2 "
Prepared poultry feed	2 "
Elevator screenings	1 "
Cocoanut meal	1 "
Dried ground fish	2 "
Meat scrap	1 "
Turnips	7 "
Ensilage	5 "
Salt Hay	1 "

Wheat. In the autumn of 1916 requests were sent to nine farmers in the county of Antigonish whose names had been handed in as successful wheat growers, asking each if he would kindly submit a sample of that season's threshed grain for analysis. Only three men were interested enough to comply with the request. The analysis of these three samples along with one from the Poultry Department at this institution are given in the accompanying table.

Table I—Analyses of Wheat.

	381	382	389	554
Water	12.30	11.32	9.57	15.48
Protein	11.75	12.30	11.80	14.09
Fat	1.65	1.95	2.00	3.00
Ash Soluble	1.62	1.38	1.53	1.98
Insoluble	0.10	0.17	0.12	0.17
Carbo-Hydrates (starch, sugar, etc.)	72.58	72.88	74.98	65.28
	100.00	100.00	100.00	100.00
Nutritive Ratio	1:6.5	1:6.2	1:6.7	1:5.1

Explanation:

No. 381. From Duncan Chisholm, Linwood, Antigonish Co., variety not stated.

382. From Peter Chisholm, Harbor au Bouche Antigonish Co., White Russian.

389. From W. W. Dyer, Antigonish, White Russian, 25 bush. per acre.

554. Feed wheat from College, Poultry Department. Badly shrunken.

These results show the first three samples to be very similar in composition. It will be noted that the fourth sample Lab. No. 554 analyses higher than these in every constituent except carbo-hydrates. This grain was immature, frozen and badly shrunken, and the results illustrate the changes which take place in ripening grain and the differences in composition which a few days or weeks make. As the ripening process proceeds the amount of starch in the grain steadily increases, accompanied by a corresponding decrease in other substances, especially water and fat.

Grain such as sample 554 is made up of, is of course worthless for milling purposes, but from the feeding standpoint, the analysis shows it to be superior to the well-ripened grain. Frosted wheat if it can be bought cheap should therefore not be despised as a feed, especially for poultry.

Wheat Middlings. The following table gives the results on two samples of middlings analyzed recently. The analysis of Lab. No. 319, done in 1916 is also given for comparison.

	647	648	319
Water	13.7	11.8	11.9
Protein	12.75	16.34	14.9
Fat	4.8	6.7	5.0
Ash Soluble	3.55	3.8	4.1
Insoluble	0.95	0.15	0.65
Carbo-Hydrates	64.25	61.21	63.45

These results show considerable variation in the composition of the samples, especially with respect to the protein. They simply point out how careful the farmer must be in the purchase of mill feeds.

Prepared Poultry Feed. At the request of Mr. McInnis of the Poultry Department two special brands of dry poultry mash for hopper feeding were sampled and analyzed with the following results:—

	Lab. No. 506 (a)	Lab. No. 506 (b)
Water	10.4	12.15
Protein	21.25	18.31
Fat	5.85	4.00
Ash Soluble	15.15	7.95
Insoluble	3.9	.5
Carbo-Hydrates	43.45	57.09
	100.00	100.00
Nutritive Ratio	1:2.7	1:3.6

Both of these contained considerable meat scrap and ground bone and as the figures show they are protein-rich foods. The nutritive ratio is too narrow for them to be fed alone. Such feeds should be used only as a supplement to the regular grain ration of fowls.

For laying hens sample "a" is considerably the better of the two, chiefly because of its much higher content of soluble ash, largely calcium phosphate which is the basis of egg shells.

Elevator Screenings. Owing to the scarcity and high prices of standard mill feeds, much of the refuse grain and screenings from the elevators, formerly wasted, are now being put on the market. A car load of this material was recently disposed of in this town for poultry feed and a sample was obtained and analyzed by this department. For comparison the results of analysis of similar material at Ottawa are given. The botanical analysis by both departments is also submitted.

Chemical Analysis.

	Truro	Ottawa
Water	13.45%	14.07%
Protein	9.87	11.84
Fat	3.15	2.07
Ash soluble	1.85	2.13
insoluble	0.25	
Carbo-Hydrates	65.16	64.53
Fibre	6.27	5.36

Botanical Analysis.

	Truro	Ottawa.
Wheat	46.8%	50%
Wild buckwheat	37.6	40
Night Oats	2.2	2.5
Flaxseed	1.1	1.0
Barley	0.5	
Weed seeds	2.7	.5
Chaff and hulls	9.1	5.7

The nutritive ratio of the Ottawa sample is 1:6.3, that of the sample obtained here is 1:7.9. A glance shows that the former is considerably the better material in all respects.

This is due to the lower percentage of chaff, hulls and weed seeds with a corresponding increase in the amount of wheat and wild buckwheat present.

This is a feed which in these days we cannot afford to overlook. Its analysis compares favorably with that of wheat given elsewhere in this article (see page 130). The selling price here has been $2.25 per cwt. Dr. Shutt, Dominion Chemist, reports on it in the October number of the Agricultural Gazette, as follows:—

> "It has a feeding value intermediate between "wheat and wild buckwheat. From its composition "it should prove an acceptable and valuable poultry "feed, with only a small percentage of waste. It is "sufficiently high in protein for general grain feeding "with a fat content not exceeding that of wheat— "which may be considered an advantage for laying "stock, the ration of which is usually enriched by "crushed green bone or meal. The comparatively "low percentage of fibre is a feature that enhances "its value for poultry feeding, as this class of live stock "cannot advantageously make use of high fibre feeds."

The one objection to it is the weed seeds, but where fed to poultry this should not be a serious matter. There are not many weed seeds that will pass a fowl's gizzard and still be capable of germination. Cooking would also eliminate this undesirable feature of the case.

Laboratory No. 403. This was a sample of cocoanut oil meal sent in by Mr. D. Vallancey, agent for the Royal Mail Steam Packet Co. at Halifax. The source of the material was British Guiana. As the name indicates, it is the residue after the extraction of the cocoanut oil. Analysis shows:

Water	6.95%
Protein	21.75
Fat	24.72
Ash Soluble	3.53
Insoluble	0.20
Carbo-Hydrates	42.85

Nutritive ratio is 1:4.5.

Theoretically this would seem to be an excellent feeding stuff but we are inclined to think that the excessively high percentage of fat would make it rather indigestible and also apt to become rancid and unpalatable if stored for any length of time. If some process for more complete extraction could be perfected this should be a valuable feed. At any rate the matter is worth investigation.

Laboratory Nos. 643 *and* 644. Two samples of ground, dried fish offal or fish tankage submitted by Mr. Rufus E. Dickie of Stewiacke. Mr. Dickie has recently established an up-to-date plant at Tangier, Halifax Co. for the steam cooking, drying and grinding of fish offal, and hopes soon to be able to market a high class product for feeding purposes. Hitherto practically all the fish offal recovered on our coast has been sold and used for fertilizer but its value as a feed, especially for hogs and poultry is beginning to be recognized and in common with such packing house products as dried blood, bone and tankage, the supply is being diverted from the fertilizer industry to the feed markets. Our analysis is as follows:—

	No. 643	No. 644.
Water	12.7	16.7
Protein	64.06	58.12
Fat or oil	8.8	18.0
Ash soluble	9.4	13.55
insoluble	0.3	0.2

These are extremely concentrated foods and considerable caution would have to be exercised in the allowance given. It is an open question as to whether such strong food, if fed to laying hens, would taint their eggs.

Both samples were in excellent mechanical condition when received, being ground very fine and free from any lumps or large pieces of bone. No. 644 contains some ground dogfish. No. 643 does not. The latter we would consider to be the better sample, not only because of the greater protein content but also because of the markedly smaller percentage of oil.

The soluble ash of both samples is more than half phosphoric acid which is very largely from organic sources—another valuable feature.

The value of these products as fertilizer is discussed under the head of fertilizers in another section of this report. (See page 138).

Laboratory No. 475. A meat scrap obtained from the College Poultry Dept. This sample contained:—

Water	9.8%
Protein	43.96
Fat	5.65
Ash Soluble	34.11
insoluble	.97
Carbo-Hydrates	5.51

No comments are necessary except to say that this is only a fair quality of what is now considered among poultrymen to be an essential of the daily ration.

Turnips. At the request of Mr. S. J. Moore of the Dominion Seed Branch, seven lots of turnips were obtained, sampled and analyzed with the following results:—

TABLE II

Analyses of Turnips.

A comparison of variety and locality of growth with moisture content as the chief point of interest	Lab. No. 428. var–Sutton's Champion grown on the College Farm.	Lab. No. 429, var-Corning grown at Plumdell Farm, (Hor. Dept.) N. S. A. C.	Lab. No. 430 var-Corning grown by J. R. Semple, Tatamagouche, N. S.	Lab. No. 431a var-Durham.	Lab. No. 431b var-Corning,	Lab. No. 432a var-unknown, a white fall turnip	Lab. No. 432b var-unknown, a Swede.
				Grown by J. Frank Forbes, Goshen, Guysborough Co, Nova Scotia		Grown by John Brown, West Lochaber, Antigonish County, N. S.	
			Results				
Water	90.10	88.40	87.20	90.30	88.70	91.30	89.40
Protein	0.96	1.22	0.86	1.21	1.51	1.06	0.92
Fat	0.10	0.17	0.13	0.08	0.11	0.10	0.11
Ash soluble	0.66	0.71	0.56	0.75	0.69	0.84	0.52
insoluble	0.06	0.03	0.02	0.01	0.02	0.01	0.02
*Carbo-Hydrates	8.12	9.47	11.23	7.65	8.97	6.69	9.03

*Carbo-hydrates obtained by difference.

The chief point of interest here is the moisture content of different varieties, and of the same variety in different localities. It may be remarked that the Corning turnip is a variety which has been much recommended for our Province and from which many farmers are now raising their own seed. Some farmers object to its small size on the ground that it takes more labor at thinning and harvesting time than the larger-sized varieties.

The following points should be noted:—

1. The water content of all three samples of the Corning variety is lower than in the others. The average is 2.2% less. This means an increase in total dry-matter and feeding value of 1320 lbs. in the crop from one acre, taking 1000 bushels as an average yield.

2. The protein in the Corning averages one-sixth of one per cent higher, although one lot (Lab. No. 430) is the lowest of all in this respect. This figures up to 100 lbs. more protein per acre.

3. Every lot of Cornings is as high or higher in fat than the others—the average being one twenty-fifth of one per cent more. This means 24 lbs. more fat per acre.

4. There is less ash in the Corning variety.

5. The Carbo-Hydrates are higher in the Corning in every instance, excepting one (lab. No. 432 (b)) which may *be* a Corning. The average is 20% more, or 1200 lbs. more per acre.

6. It is also interesting to note the marked difference in composition between the white fall turnip (No. 432 (a) and any of the others. For example it contains over 4% more moisture than No. 430. From these figures it would seem that the Corning variety has the best of the argument, although such a statement cannot be made positively until further analysis has been carried on.

Silage. Five samples have been analyzed this season three being the O. P. V. now coming into vogue. and two of corn.

	433	454	468	486	563
Water	84.12	80.8	75.45	73.85	77.50
Protein	1.68	2.22	2.39	2.75	2.87
Fat	0.56	0.77	0.98	1.42	0.62
Ash soluble	0.93	0.88	0.97	1.48	1.43
insoluble	0.24	0.38	0.58	0.44	0.34
Carbo-Hydrates (by difference)	12.47	14.95	19.63	20.06	19.24
	100.00	100.00	100.00	100.00	100.00
Acidity			1.35	1.75	0.22

Explanation:

No. 433 from College silo, sample taken Jan. 20, 1917. Corn silage.
No. 454 from College silo, sample taken March 17, 1917. Corn silage.
No. 468 from College silo (O. P. V.) sample taken April 24, 1917.
No. 486 from D. A. Higgins, Fort Lawrence, N. S. (O. P. V.) Complains that his cows won't eat it.
No. 568 (O. P. V.) taken fresh from cutter at silo filling time on College farm, August 14, 1917.

These figures are rather interesting, showing as they do that the O. P. V. (oats, peas and vetches) silage analyzes considerably better than does that from corn. The water averages nearly 7% lower and all other constituents are higher in every case, thus giving greater feeding value. We do not consider the lowering of the water content to be enough to make the material inferior from the standpoint of succulence. Since our short seasons make it a difficult problem to bring corn to a reasonable degree of maturity the O. P. V. silage is bound to increase in favor. The one great argument in favor of corn is the immense tonnage of fodder which can be raised on one acre.

A word on acidity. The test is an important one and should not be overlooked. The normal percentage in silage which has been fermenting for some time is about 1.25%. New silage of course has very little acidity. The acid is a product of the fermentation which takes place in the silo. The acidity of No. 486 is too high and probably explains why the cows refused the feed. Too much compacting at the time of storing is the chief cause of high acidity; feed cut too green also induces it.

Laboratory No: 613. This was a sample of salt marsh hay obtained from Isaac Allen, Clifton. Large quantities of salt hay are annually cut and fed on the farms of Nova Scotia, which border on the sea coast or on the tidal rivers, and many farmers think it is great feed, especially for young stock.

Analysis shows:—

Water	23.65%
Protein	6.34
Fat	2.25
Ash soluble	6.35
insoluble	5.59
Fibre	19.20
Carbo-Hydrates	26.62

Nutritive Ratio 1:9.5

These results show a feed comparable in all respects with ordinary timothy hay, indeed when the relative percentages of fiber--salt hay—19% and timothy 29%—are considered, we would be inclined to give the salt hay the preference for beef cattle and young stock such as yearlings or two year old steers. There would seem, therefore, to be some reason for the opinion often stated by farmers that their stock will thrive better on salt hay than on that from the standard grasses. Analysis of the 6.35% of soluble ash in the fodder shows:—

	Salt hay	English hay (*Compare*)
Water in hay	23.65%	17.00%
Lime	0.28 "	1.07 "
Phosphoric Acid	0.35 "	.41 "
Potash	0.99 "	1.70 "
Soda	1.31 "	.31 "
Undetermined	3.42 "	3.21 "
Total	6.35%	6.70%

The higher percentage of water is due to the fact that the sample was taken in late October from a stack built in August and exposed to all conditions of weather.

Section 4.

Fertilizers.

Prices of all commodities are regulated to a certain extent by the price of fertilizers. The chemist recognizes that now, if ever, all our knowledge of fertilizers should be marshalled. We hear of scrap iron but not of scrap nitrogen; this material by nature seems to prefer the air where it eludes the plant and helps to increase the price of food. We must, as far as possible, prevent the escape into the air and ocean of what plant food we have.

One of the duties of the Agricultural Chemist is by analysis to exercise such a control over fertilizers, feeding stuffs, insecticides, etc. that any farmer may, by knowing the composition of the commercial materials, make his ration of feeding stuffs, his spray mixtures or use the proper proportion of fertilizer ingredients. Many questions are asked about the composition of commercial fertilizers. While the Dominion Inland Revenue Department does this work officially yet some results of our analysis of commercial articles are given in this report since an effort is made to get as much accurate information as possible about any material which may be of some agricultural use. Such material may be included under:—

(a) Materials that we ordinarily use, such as slag, etc.

(b) Mixtures that we never use such as waste products and fertilizers of low grade.

Both soil analysis and field experiments show that phosphoric acid must be applied to the soils of Nova Scotia. The three popular forms of this material are basic slag, acid phosphate and ground bone. Emphasis has been put on the first on account of its good effect on heavy lands and also on account of its low price. The following comparison shows the relative price of the first two for three successive years:—

	Price per unit of Phosphoric acid.		
	1914	1917	1918
Basic Slag	.94	1.25	2.05
Acid Phosphate	1.00	1.44	2.00

The following is the analysis of basic slag used during 1917.

No.	Phosphoric acid	Citric acid Soluble	Total lime.
421	9.97	5.29	33.
526	11.97	7.56	....
527	14.8	11.97	....
567	7.31	1.51	55.

These results, with such marked variations in the total and citric soluble phosphoric acid, are enough to show the buyer that he must use much more slag per acre and perhaps not get as quick results as with the slag of a few years ago. A series of pot experiments to illustrate the effect of various slags failed on account of an error in the use of one of the materials.

The following summary of information concerning the use of slag in England shows the unsettled opinion on the use of present day basic slag:—

Until recently practically the whole of the phosphatic basic slag on the market was the Bessemer basic slag with 70% to 90% of its phorphoric acid, soluble in citric acid. This test, which was devised by Wagner of Germany, has been pushed for all it is worth by the German slag syndicate and has, without apparently very good reason, become the basis for the valuation of basic slag. Soxhlet disputed Wagner's work and was found not guilty of libel action which ensued; still, the test remains.

A few years ago the steel manufacturers began the open hearth steel manufacturing in which fluorspar was introduced in order to make a more fusible slag, thereby enabling them to introduce a larger quantity of lime; the result is what is known as the fluorspar basic slag which, by the citric acid test, shows 20-50% of the phosphoric acid soluble in citric acid.

G. S. Robertson of England has, for several years, studied the comparative solubility of the two kinds of basic slag and also the various rock phosphates. On Feb. 29, 1916, he came to the following conclusions:

1. "The results clearly show that the citric acid test gives no true idea of the solubility of the phosphate in "fluorspar slag" and affords no guide to its value to the plant."

2. "The use of fluorspar in the manufacture of steel by the open hearth process results in the production of a phosphatic slag with low citric solubility. Nevertheless the slag is completely soluble in citric acid if sufficient time is spent on the extraction."

3. "The phosphate or phosphates which the slag contains do not appear to be in combination with silica and they seem to bear a very close resemblance to those contained in mineral phosphates."

On March 15, 1917, Prof. Gilchrist of England read an article on basic slag as affecting agricultural development. In the discussion following this, Prof. Robertson said that what was really wanted was a series of experiments in many parts of the country to test the value of fluorspar basic slag as compared with Bessemer slag. For two years he had carried on such experiments in Essex on various types of soil and was able to give partial results. In his opinion the fluorspar slag was just as valuable as the highest citric soluble slag. He said that there appeared to be no particular reason why, in the citric soluble test, 5 grammes of phosphate, or shaking for ½ hour, or a volume of 500 cc. or a strength of citric, 2%, should be adhered to. If one gram were used instead of five and the other conditions kept as usual, the order of solubility of the various phosphates was often completely altered. For example, a particular sample of fluorspar basic slag had a solubility of 45% and a rock phosphate 38% according to the usual citric acid test using 5 grammes. When, however, the test was repeated using one gramme, the slag showed 68% and the rock phosphate 90%. He gives many figures to show that by extracting the slag five times with citric acid, instead of once, from 90 to 100% of the fluorspar slag phosphoric acid is dissolved.

The Bessemer basic slag contains a certain percentage of silica in combination with the phosphate. This is considered to cause an increased solubility of the slag in the citric acid solution. Calcining acid phosphate has been found by Robertson to cause the slag to take up more lime, thereby rendering it more insoluble. The fluorspar in the open hearth process apparently takes the place of the silica in the Bessemer process. This gives much the same chemical compound as apatite, which is our most insoluble form of rock phosphate. Robertson's claim is "Are we justified in assuming that the plant is able to get only what is soluble by one extraction with citric acid?" His opinion is that the fineness of grinding of the slag is of more consequence than making it soluble in citric acid solution.

Since slag has been so much used in Nova Scotia and since numbers 526 and 527 above are not on the market for 1918, this question is of great moment and more definite information will be sought before reaching a conclusion.

Slag contains quite a large amount of lime, about 15% of which will help to correct the acid condition of the soil. The amount in samples 421 and 567 which are sold at the present time is somewhat higher than that found in the old Grade A slag.

Sea-Weed and Fish Waste.

The farmer who lives near the sea shore has an advantage, in that by the use of sea-weed for potash and nitrogen, fish waste of all kinds for nitrogen and phosphoric acid, he is able to not only get a cheap fertilizer but also to leave for the inland farmer the usual commercial fertilizer which is scarce, largely owing to transportation problems.

The following table shows the amount of material remaining after all the water, usually about 85%, has been dried out of seaweed.

	312A	312B	313	550A	550B
Organic matter.	83.7%	76.5%	76.86%	68.05%	82.57%
Nitrogen......	.62	.95	1.31	2.03	2.34
Phosphoric acid.....	.29	.29	.51	.76	.54
Potash........	2.05	3.87	5.01	7.35	7.48

What is the commercial value of No. 313 in the wet condition?

One ton contains	4 lbs. of nitrogen @ 20c per lb..	.80
	16 lbs. of potash @ 10c per lb..	1.60
	2 lbs. of phosphoric acid @ 5c..	.10
		$ 2.50

If paid for at present prices of commercial fertilizers, this material would be worth $5.00 per ton. For use as a complete fertilizer, sea-weed is deficient in phosphoric acid.

Fish Waste.

The value of fish waste is indicated in the following table:—

	467	643	644
Water...........................	7.00%	12.7%	16.7%
Volatile matter..................	87.90	77.6	69.55
Phosphoric acid..................	3.45	5.29	7.06
Nitrogen.........................	10.42	10.25	9.3
Oil..............................	27.90	8.8	18.00

No. 467 is dog fish scrap used by R. H. Kennedy, Colchester Co.
" 643 is fish scrap (no dog fish) prepared by R. E. Dickie, Stewiacke
" 644 is fish scrap with dog fish prepared by R. E. Dickie, Stewiacke.

Since such refuse obtained by drying and grinding all the waste material from dressing fish, is in great demand for the manufacture of some of the commercial fertilizers, it follows that where farming is carried on near fishing stations, an effort should be made to save the crude material, by composting it or putting it under the soil as soon as possible, as decay takes place rapidly.

"What is the value?" is the question asked about the following:—

No.	Insoluble	volatile	Lime	Phosphoric acid	Potash	Nitrogen	Estimated value per ton
476 Soot	14.67	64.94	2.10	.32	.13	1.6	$ 9.00
528 Wood ashes	43.32	33.68	4.2	.63	.85	1.77	11.00
446 Wood ashes	.8	....	41.5	4.8	3.7	....	17.00
469 Wood ashes	16.8	....	33.2	1.89	4.57	....	17.00
470 Coal ashes	29.64	....	4.	.25	.14	....	No value
Inverness Coal 474 Coal ashes	80.18	....	4.40	.88	.24	....	" "
Pictou County 615(a) Blast	30.14	12.50	15.8	.94	3.36	....	9.00
and furnace. 615(b) dusts	55.82	1.55	15.0	1.9	.7	....	4.00
Dom. Iron & Steel Co. 624 Hard Coal ashes	93.95	1.1	.5	.16	1.	....	No value

In the above, potash is considered at 12c per lb., phosphoric acid at 8c, and nitrogen at 25c.

Coal ashes, contrary to the idea of some, are of no value except possibly in some cases to correct bad physical conditions. No. 615(a), lately obtained, contains a good percentage of potash. A recent leaflet from England says, "The flue dust obtained from blast furnaces will go far to counteract the deficiency of potash from other sources." There, four grades of flue dust are being put on the market varying from 3% to 13% potash and selling at from $8 to $24.00 per ton, making the potash worth about 11c per lb.

On account of the limited supply its use is recommended for potatoes and any surplus for turnips and mangolds.

Enquiries about the composition of rocks are often received. No. 481 from New Glasgow is claimed to be an excellent fertilizer when crushed. This contains as follows:

Matter insoluble in strong acid	64.80%
Iron and aluminium oxides	26.71
Lime	.55
Phosphoric acid	.19
Magnesia	1.75
Potash	.08

One fails to see wherein the above differs from some of our mineral soils.

No. 488 from Orangedale, C. B., said to contain sufficient phosphoric acid to warrant crushing for fertilizer shows as follows:—

Insoluble matter	60.24%
Iron and aluminium oxides	21.00
Phosphoric acid	.5
Lime	7.6

No. 522 from Inverness County, a rock formerly sold as a phosphate fertilizer, analyses as follows:—

Insoluble matter	50.8%
Carbonate of lime	28.35
Carbonate of magnesia	3.78
Sulphate of lime	7.58
Phosphoric acid	.95

Unless such material be used on the land near the deposit one cannot justify its use.

With a view of getting an idea of the potash content of some typical rocks of Nova Scotia the following have been analyzed by extracting with strong hydrochloric acid.

No.	Insoluble.	Phos. acid	Potash	Lime
332 Feldspar, Pictou County.........	96.28	.....	.06	.3
348 Quartzite, Halifax Co Locally called "whin"	88.72	.....	.4	.3
349 Slate, Upper Sackville. Halifax Co.	84.48	.13	.12	1.
356 Feldspar, Newfoundland	94.48	.13	.1	.6

Section 5.

Soils.

The soil work has been continued during 1917. The plan is to select certain geographical areas such as a river basin, obtain typical samples, talk over in the field soil problems with as many farmers as possible, analyze these soils, more or less fully and finally to give a practical interpretation of the results obtained to the individual farmer. This should encourage the study of the soil and give a better appreciation of the importance of crop rotation.

When this work becomes well organized, its purpose will be to give the following knowledge:—

1. The plant food requirements of our staple crops.
2. Total amount of plant food in the soil.
3. The availability of this food by laboratory and field tests.
4. The best methods of providing the plant with food, either by setting it free from the soil or by adding fertilizers.
5. The best method of keeping the soil in a condition to produce paying crops.

Work has been done in Inverness County, see table, No. IV. Work begun last year in Queens and Lunenburg Counties is continued in Table No. V, which also contains results from soils obtained in Victoria County and Central Hants, where the work is to be continued.

Since different soils require different treatment and certain crops are adapted to particular soils, it seems wise to classify soils in some way. Various methods have been adopted but no hard and fast classes can be made. One of the best basis of classification, the size of particle, is shown in Table No. III. Since this factor is what affects the texture of the soil, as well as the plant food question, it is very important. On account of lack of equipment only eight samples were so tested this year, In future, more emphasis will be put on this classification.

The following table shows what a great variation we have in soil types. For a full explanation of physical analysis of soils and its importance in the study of any particular soil, the reader is referred to Part III, page 22, of the Annual Report of the Secretary for Agriculture, Nova Scotia, for the year 1915.

TABLE III.

Physical Analysis of Soils.

No.	Locality	Gravel	Coarse Sand	Medium Sand	Fine Sand	Very fine sand	Silt	Clay	Type of Soil.
191	Chegoggin Yar. Co.	3.4%	5.37%	4.25%	4.5%	43.43%	16.9%	3.67%	Sandy loam
277	Caledonia Queens Co	10.47	16.3	4.96	3.36	15.66	37.8	9.35	Gravelly loam
*452	New Glasgow Pictou Co	none	0.5	0.22	0.5	13.06	57.48	13.04	
511	Gillisdale Inverness Co	4.56	2.77	2.31	1.01	12.2	43.46	17.94	Clay
531	N. E. Margaree, Inverness Co.	none	0.59	.55	.16	4.45	20.65	55.57	Heavy clay
501	Upper Stewiacke Col. Co	0.15	0.5	1.1	2.38	32.52	42.44	9.98	Clay loam
570	Halifax	27.32	19.2	5.0	3.87	17.15	30.79	8.0	Gravelly loam
625	Baddeck, Vict. Co.	17.4	8.69	2.66	2.32	21.56	26.33	21.42	Clay loam

*No. 452 is a river deposit, not a true soil, therefore in the naming of the types it is omitted.

Potato and truck soil should have 60% medium and fine sand, 30% of silt, 5% clay.

Garden and small fruit should have 50% sand and 10-15% clay.

Grain and grass should have 50-70% silt and fine sand and 10-15% clay.

The above facts explain why some soils warm up more quickly than others, why drought does not affect them, why fertilizers last longer in one soil than another, why clover may kill out on certain fields.

Our chief field of soil study has been the Margaree Valley of Inverness County. The section covered extends from Belle Cote about 4 miles north of Margaree Valley to Frizzleton on the north east branch of the Margaree River and to Gillisdale on its south west branch, a distance of about 30 miles. This is part of the country visited by the late Professor John Macoun, Naturalist of the Dominion Government, who reported in 1898 as follows:—"Everywhere I went, it was painfully evident that agriculture was neglected on the island and the people were falling into the belief that their soil could not compete with that of other lands in the raising of any kind of produce." He further said that he was surprised to find that no vegetables were used by the people. Upon enquiry, he found that none were grown, the custom being to trade fish for vegetables and that year fishing was a failure. The people now show a different spirit and are anxious to learn all they can about up-to-date agricultural methods. In carrying on our soil and limestone work at Margaree, I wish to express my appreciation of assistance given by Rev. Dr. R. McDonald, East Margaree, J. A. McLellan, Belle Cote, J. A. Burton and J. J. Crowdis, Northeast Margaree, M. A. Doyle, Margaree Forks, and D. D. McFarlane, Southwest Margaree

From our study of this section so far, we are able to state as follows:—The geology of the area favors the formation of strong soils. We have the Pre-Cambrian forming most of the hills drained by the brooks which flow into the Southeast and Southwest Margaree River. These rocks are fine grained syenite, felsite, mica shist, red felspar, hornblende and granite. These are often found in great variety in a small area and when worn away by the many brooks form a mud, rich in some of the elements of plant food. For example note the high percentage of potash 1.07% in No. 531, which was taken from an area of several thousand acres at Rossville. The acid soluble potash in the other soils of this section average about .5 per cent.

The high hills on the east of Belle Cote and along the east of the river to Lake Ainslie and on the north side of the north east branch of the river are made up of Lower Carboniferous rocks as compact grey and red sandstone, quartzites, grit and conglomerate, containing felspar, micaceous shales, all often in contact with trap rock.

The natural Carboniferous rocks lie along the shore at Belle Cote and border the river and its two branches. Here are softer sandstones and shales, in many cases with organic remains. The Carboniferous formation has many deposits of limestone and gypsum. It follows that the soils of this valley are made up of the remains of Pre-Cambrian rock, high in potash, and of Carboniferous rock, high in carbonate of lime and gypsum. There are evidences that some of the soil of the valley is composed of glacial drift.

In all about fifty samples were taken in the area from Belle Cote to Frizzleton and a few in the Valley of the Southwest Margaree. All of these have been tested for lime requirement. See page 161 and the following in Table IV have been selected for complete analysis:—

TABLE IV.

Inverness County Soils.

For further comments see page 172.

No.	Nitrogen	Phosphoric Acid	Potash	Lime	Magnesia	Water in air dried Soil	Volatile matter mostly organic	Insoluble	Soda	Iron Oxide and Alumina	Lime requirement. Tons per acre Carbonate of Lime
514	.5	.19	.41	15.0	4.75	3.8	17.45	29.04	.24	11.91	1.1
541	.32	.17	.72	.4	.36	3.65	9.05	74.59	.22	11.33	3.5
516	.17	.06	.43	.25	.25	1.95	6.15	83.92	.21	6.44	2.8
545	.12	.09	.63	.2	.22	2.85	8.15	77.61	.17	10.21	5.0
629	.33	.16	.26	.3	.4	3.6	11.8	74.23	.11	7.94	6.7
520	.25	.14	.56	.5	.43	2.95	7.75	75.92	.14	11.36	5.0
531*	.17	.13	1.07	.25	.61	13.4	10.2	57.82	.16	15.47	13.8
534	.43	.16	.29	.3	.43	4.6	14.7	71.66	.1	8.84	6.0
546	.34	.13	.4	.3	.22	4.85	14.15	71.76	.2	8.17	7.1
524	.38	.19	.57	.4	.72	3.0	11.75	71.94	.14	11.11	7.7
451	.44	.14	.36	.7	.8	3.3	15.5	68.37	.1	11.7	7.0
511*	.21	.19	.73	.5	.43	3.3	10.35	71.34	.24	13.11	8.1
540	.19	.06	.16	.6	.11	1.15	5.2	88.21	.21	3.14	4.2
512	.19	.13	.15	.15	.25	1.3	5.25	89.24	.16	3.17	4.6
553	.04	.05	.28	.6	.36	1.4	3.2	89.62	.21	4.65	1.9
515	.16	.13	.44	.6	.32	1.8	6.5	84.18	.28	6.36	2.8
Average	.25	.13	.47	.4	.39	3.54	9.31	76.69	.18	8.86	5.7

No. 514 is not included in the average as it is a very unusual type of soil.

*For physical analysis see Table III.

EXPLANATION OF TABLE IV.

No.
514. John Chaisson, St. Joseph du Moine, Inverness Co.
541. J. P. Aucoin, Belle Cote.
516. A. A. Taylor, Margaree Harbor.
545. J. C. White and Ben LeBlanc, East Margaree (two samples combined).
629. John L. Tompkins, N. E. Margaree, good turnip field.
520. Jas. Ross, N. E. Margaree.
531. “ “ “ “ Swampy upland, virgin soil.
534. J. J. Crowdis, N. E. Margaree.
546. J. E. Burton, N. E. Margaree. Stable manure and slag in 1916, clover plowed under.
524. Absalom E. Ingraham, Frizzleton, Inverness Co.
451. Jas. A. McDonnell, Upper Margaree.
511. John F. Gillis, Gillisdale, Inverness Co. Hill.
540. D. A. McIsaac, Inverness Co. Composite of three samples.
512. J. E. Beaton, Inverness. Field in wheat.
553. Allan McPhee, Little Mabou, Inverness, Not worked for 15 years, Sample is representative of 150 acres.
515. D. J. McLeod, Dunvegan, Inverness.

From the field study and analysis of the Margaree soils, there is every evidence that they are among our best soils. See Table VIII.

These soils except No. 514 respond to the litmus test, showing that there is a marked degree of acidity. The amount of limestone needed to put the soil into what is considered to be the best condition, is shown in the lime requirement column. Four soils from other parts of Inverness County were studied. No. 512 is a rather light seashore sandy soil, which had been well fertilized but is deficient in potash and lime. Further comments on the treatment of average soils can be found on page 173. The study of these soils will be continued in connection with the limestone experiments now under way.

TABLE V.

Analysis of Soils from Queens, Lunenburg, Hants and Victoria Counties.

For Comments see pages 160 *and* 172.

No.	Nitrogen	Phosphoric acid	Potash	Lime	Magnesia	Water in air dried soil	Volatile matter mostly organic	Insoluble	Soda	Iron oxide and alumina	Lime requirement tons per acre carbonate of lime.
Queens and Lunenburg Cos....											
277*..........	.33	.24	.36	.25	.4	2.1	11.7	72.62	.2	11.56	3.8
375..........	.34	.16	.27	.35	.58	6.0	12.65	69.19	.09	9.74	3.5
386..........	.32	.06	.29	.4	.47	2.5	10.65	76.54	.05	9.73	3.9
401..........	.42	.1	.23	.3	.29	2.8	15.8	70.93	.15	11.2	5.0
411..........	.23	.06	.38	.4	.58	1.6	8.2	78.7	.11	9.92	2.9
Hants Co.											
587..........	.26	.09	.16	.1	.18	2.6	9.2	74.75	.15	11.21	4.4
589..........	.24	.19	.15	.1	.25	2.65	10.25	71.82	.16	13.11	4.25
594..........	.28	.09	.22	.2	.25	4.2	8.85	74.73	.13	10.41	3.9
600..........	.2	.09	.27	.9	.25	2.0	6.3	82.0	.14	7.51	1.2
603..........	.14	.09	.24	.3	.18	1.45	5.0	85.47	.11	6.91	2.8
606..........	.2	.13	.14	.5	.68	1.8	6.9	80.36	.15	9.27	3.4
Victoria Co.											
625*..........	.35	.22	.35	1.0	1.0	3.95	12.5	68.68	.13	12.18	5.4
626..........	.21	.16	.28	.8	.9	2.75	9.15	76.26	.11	9.94	5.0
627..........	.23	.16	.35	.4	.5	2.55	7.55	79.85	.26	8.84	4.25
628..........	.35	.22	.9	.5	.58	3.55	10.5	73.26	.21	11.68	6.7

*See Table III for physical analysis.

EXPLANATION OF TABLE V.

No.

277. W. J. Baxter, Caledonia, Queens Co. Clover lasts only one season.
375. C. R. DeLong, Farmington, Lunenburg Co. Good clover, no lime.
386. L. C. DeLong, Barss' Corners, Lunenburg Co. No lime or fertilizer.
401. Fred Kempton, Kempt, Queens Co. Clover poor.
411. F. W. Grant, New Germany, Lunenburg Co. In potatoes last year; barnyard manure, dogfish, acid phosphate and potash used.
587. Walter Haley, South Rawdon, Hants Co. Hay for 7 years.
589 W. H. Lawson, South Rawdon, Hants Co. A poor field, slaty.
594. Angus Hall, Central Rawdon, Hants Co. Old land, no fertilizer.
600. H. C. Burchell, Windsor, Hants Co. Alfalfa field, well limed.
603. Wm. Redden, Windsor, Hants Co.
606. Wm. O'Brien, Windsor Forks, Hants Co.
625. Jas. T. Keiley, Baddeck Bridge, Victoria Co. An old field.
626. Colin J. Nicholson, Baddeck Bridge, Victoria Co An old field near lime rock.
627. Geo. Ingraham, Middle River, Victoria Co.
628. Dan D. McRae, Middle River, Victoria Co.

TABLE VI.

Analysis of Stewiacke Valley Soils.

	491 (c)	492 (b)	494	495 (b)	499 (d)	500	501 (b) *	503 (b)
Water	2.45	2.95	2.65	2.40	2.45	2.05	2.40	2.75
Volatile matter	6.55	8.40	7.50	9.60	7.80	6.75	8.30	8.95
Insoluble "	80.59	76.47	81.38	75.83	79.09	82.58	76.93	78.92
Iron oxide	3.58	5.06	3.52	5.95	3.90	3.00	5.12	3.97
Alumina	5.39	5.98	4.25	5.50	4.94	4.37	5.92	4.44
Sulphuric acid	0.12	0.14	0.12	0.17	0.15	0.10	0.14	0.17
Phosphoric acid	0.13	0.16	0.13	0.25	0.16	0.13	0.16	0.19
Lime	0.80	0.35	0.50	0.50	1.00	0.40	0.60	0.55
Magnesia	0.29	0.15	0.22	0.33	0.29	0.22	0.33	0.36
Potash	0.49	0.34	0.24	0.32	0.43	0.28	0.33	0.33
Soda	0.18	0.22	0.14	0.18	0.20	0.16	0.17	0.17
Total	100.57	100.22	100.65	101.03	100.41	100.04	100.40	100.80
Humus	2.80	3.40	3.70	4.60	3.50	3.50	3.30	3.60
Nitrogen	0.19	0.23	0.22	0.28	0.28	0.21	0.26	0.27
Lime requirement Tons 90% C_aCO_3 per acre.	3.9	3.9	4.25	5.8	3.9	3.9	4.25	4.6

*See Table III for physical analysis. NOTE—The underlined items are the important ones.

EXPLANATION.

No. 491(c)—Upland soil from the farm of Jas. Creelman, Springside; red clay loam, previous to 1915 a virgin soil, two crops of oats since. Needs drainage badly.

No. 492(b)—Intervale soil from the farm of Lyman Hamilton, Springside; a clay loam, hay for 4 years. Barnyard manure only fertilizer used.

No. 494—Upland soil from the farm of Andrew Dickie, Eastville, light loam, hay for 5 years. Rather lightly manured.

No. 495(b)—Brook intervale soil from the farm of S. G. Cox, Eastville, dark colored, silty loam with a blue clay subsoil. Grows good crops the first year; but grain lodges and the hay winterkills and is crowded out by coarse grasses. Hay for 3 years. Has been well fertilized.

No. 499(d)—Intervale soil from the farm of Chas. Graham, Pembrook; clay, well manured, hay for 3 years. Thought to have been spoiled some years ago by plowing under a rank growth of clover.

No. 500—Upland soil from the farm of S. C. Cox, Pembrook; loam, hay for 6 years; only fair manuring.

No. 501(b)—Intervale soil from the farm of D. F. Creelman, Newton Mills; rather heavy clay loam, turnips last year, 30 loads of manure per acre and 5–600 of slag.

No. 503(b)—Upland soil from the farm of Henry Johnston, Cross Roads; clay loam, oats last year. Ten loads of manure per acre and some ashes.

These soils are representative of the Upper Stewiacke District. The area from which the samples were taken belongs to what is known to geologists as the Carboniferous formation which embraces large tracts of country here and there through Nova Scotia. It includes all the intervale and other low-lying land in the Stewiacke Valley and also the hills nearer the river. The chief characteristic of this formation is the abundance of limestone and gypsum or plaster. Other rocks such as sandstone, shale and conglomerate are also native to it. On the south side of the river and at a distance of from one to two miles back from it this formation ends abruptly and gives place to the Cambrian formation characterized by such rocks as quartz and slate. On the north side it extends much further back finally giving place to the Devonian, which consists principally of shales and conglomerate, but no limestone. At the head of Eastville it ends and the Devonian formation extends across joining the Cambrian along the headwaters of the St. Mary's River.

Thus, although the river flows for most of its length through the Carboniferous region, it and its main tributaries, the Cox Brook and the Pembrook have their source and flow for a considerable distance through territory very different from the Carboniferous. It naturally follows that the soil of the district has been built up from a great variety of rocks, and we would suppose therefore that there would be considerable variety in the soils. This is not the case. The results of chemical analysis as well as the outward appearance of the soils show them to be quite uniform in character. There are of course minor differences such as we notice between upland and intervale, but for the most part the variation is small.

Soils of the Carboniferous period are usually the most fertile we have and these are no exception. As the fertility of soils is indicated in a large measure by the amounts of nitrogen, phosphoric acid, potash and lime present in them, let us glance back to the table of results and consider these soils from the standpoint of each of these essential components. For the basis of comparison and calculation the soil on one acre one foot deep, weighing on an average 2,000,000 pounds, is considered. Although we do not plow more than 6 inches at the most, yet the plant roots go below plow depth, and generally speaking, the plant food in the first foot of soil is within their reach. Taking the essential constituents in the order already named.

1. *Nitrogen.* An average soil will contain 0.2% of nitrogen, which is equivalent to 4000 lbs. of nitrogen in the first foot of soil. The average of these eight Stewiacke soils is 0.24% or 4800 lbs. of Nitrogen per acre.

2. *Phosphoric acid.* An average is 0.2% of phosphoric acid, or 4000 lbs. per acre. The average of these is 0.16% or 3200 lbs. per acre.

3. *Potash.* An average for potash is 0.3% or 6000 lbs. per acre. The average of these is 0.34 or 6800 lbs. per acre.

4. *Lime.* An average is 0.5% or 10,000 lbs. per acre. The Stewiacke soils show an average of 0.59% or 11,800 lbs.

The volatile or organic matter is also a point to be observed because as a rule the higher it is the greater will be the per cent. of nitrogen and the greater will be the bacterial and chemical activity in the soil. A good average for organic matter is 7%. These soils average 8% so that they have a safe margin. As to percentage content of humus these soils are fair. They average 3.55% which is considerably higher than most Nova Scotian soils but not up to the requirements of a first class soil. A good average is 5% and up to 10%, over 10% is considered rich. For the reader who may not clearly understand what humus is we may say that it is organic matter, either vegetable or animal, which has become so completely decayed that it is thoroughly mixed with the soil and needs to be changed comparatively little before being of use to plants. The above figures are self-explanatory. All that needs to be said is that these soils are considerably above the average except in phosphoric acid and humus. They are rather high in lime, which is characteristic of this formation, yet in spite of this fact they are as sour as most of our Nova Scotian soils requiring about 4.3 tons of limestone per acre to sweeten them. This is due to the fact that the lime, although present is not in a form active enough to destroy the acids. With this acid condition remedied by the application of liberal amounts of limestone these should be splendid soils for clover as the high content of potash favors the growth of clovers and other leguminous plants. The deficiency in phosphoric acid can best be remedied by the addition of barnyard manure which at the same time will increase the humus content, and basic slag. The latter should give excellent results on soils as high in organic matter as these are.

It may be of interest to mention that the average of the 4 intervale soils is slightly better than that of the 4 from the uplands. This is what would be expected but the difference in favor of the intervales is not so great as is generally supposed. The main difference is in the organic matter, which is 1% higher in the intervale soils.

Lime requirement or soil Acidity. These eight soils were picked for complete analysis as being representative of a lot of thirty-six obtained in the district of Upper Stewiacke The lime requirement or soil acidity test was determined on all of the 36 and the following results noted-:—

1. The average lime requirement of 24 unlimed soils was 3.6 tons of 90% limestons per acre necessary to neutralize the acidity.

2. The average lime requirement of 8 limed soils was 2.5 tons of 90% limestone per acre. The applications were all made in 1916 the average amount used being 2.5 tons per acre so it is seen that in one year the limestone applied has reduced the sour condition of the soil from 3.6 to 2.5 or in other words a fraction over 30%.

3. The uplands and intervales show the same average lime requirement i. e. 3.6 tons limestone per acre.

Considering the eight soils given in the table individually: No. 491(c)—fair in nitrogen and humus, low in phosphoric acid, extra high percentage of lime, very good in potash, sour. This soil if drained and well limed would be an ideal one for clover. With some manure should be the best of hay land.

No. 492(b)—a good all-around soil; should show results from basic slag or bone meal with a good application of lime.

No. 494—Somewhat run out, very sour. Probably sufficient nitrogen, but poor in potash and phosphoric. Should be plowed oftener. Would respond to a good heavy dressing of lime and light and frequent applications of manure.

No. 495(b)—Naturally a very rich soil, especially in nitrogen and phosphoric acid but very sour. Drainage and limestone are the remedies here. Ought to be a good soil for grain.

No. 499(d)—The figures show an excellent soil in every respect barring sourness. Particularly noticeable is the very high percentage of lime. Potash and nitrogen are also good; ideal for hay. Limestone again would help. Judging from the analysis the clover plowed under some years ago has had a beneficial effect rather than otherwise.

No. 500—Rather poor in all respects. More frequent cultivation, manure and lime would help things very materially. Ought to be a good soil for potatoes.

No. 501(b)—A very good soil, especially in lime and nitrogen. Basic slag would give good results. Limestone would remedy the acid condition which is too high.

No. 503(b)—Except for its sour condition is also a good soil, the best upland soil of the lot. Like all the rest it needs liming. This is a good soil for roots or grain.

TABLE VII.

Analysis of soils from Different Areas.

For Comments see page 172.

No.	Nitrogen	Phosphoric acid	Potash	Lime	Magnesia	Water in air dried samples.	Volatile matter mostly organic	Insoluble	Soda	Iron oxide and alumina	Lime requirement Tods per acre carbonate of lime.
191*	.39	.09	.15	.7	.68	2.55	14.15	71.09	.08	10.35	4.1
232	.23	.16	.41	.4	.5	2.4	8.65	75.54	.07	11.04	1.8
419a	.23	.09	.31	.3	.79	3.9	10.85	71.0	.22	13.2	4.25
427	.17	.1	.19	.1	.36	7.2		83.2	.21	7.3	3.0
484	.24	.13	.47	.1	.4	2.3	7.95	77.97	.19	10.29	6.9
618	.09	.06	.14	1.7	.18	.75	4.25	88.28	.14	4.24	6.4
552	.12	.08	.33	.3	.22	2.3	4.4	84.49	.15	7.72	5.1
570*	.41	.5	.17	.5	.36	3.7	13.65	69.12	.2	12.0	4.4
571	.86	.32	.31	.9	.29	15.1	32.35	42.48	.22	7.58	7.6
471	.17	.31		.25		8.7		79.45		10.5	2.1
608	.16	.22	.22	.6	.22	2.35	7.2	81.7	.1	7.18	1.8

*See Table III for physical analysis.

EXPLANATION OF TABLE VII.

No.
191. John C. Corning, Chegoggin, Yarmouth Co. Upland soil.
232. R. M. Wood, Carter's Point, N. B. Undrained upland, barn manure.
419a John A. McLean, Newtown, Guysboro Co. New land, intervale, well drained.
427. A. R. Campbell, R. R. No. 3, New Glasgow.
484. A. C. Bell, New Glasgow. Field will not grow anything.
618. H. A. B. Glendenning, Springhill. 20 acre field in pasture 20 years.
552. Plumdell Farm, Truro. Virgin soil.
570. Henry Archibald, Chebucto Road, Halifax. Market garden soil, fair drainage much broken slate, 1′ to 1½′ to slaty bed rock.
571. P. J. Shaw, Berwick, Kings Co., from head of peat bog, never cropped, drainage poor. Blue joint grows.
471. M. M. Christie, Glace Bay. A garden soil. Crop has been lettuce which does not do well.
608. L. M. James, Sydney, C. B.

TABLE VIII.

Comparison of Plant Food in Various Groups of Soils.

The Percentage is followed by the number of pounds in 1 *acre* 6 2-3 *inches deep*

	Nitrogen %	Phosphoric acid %	Potash %	Lime %	Volatile Matter %	% Insoluble
Average of 15 soils from Inverness Co..............	.25 5000 lbs	.13 2600 lbs	.47 9400 lbs	.4 8000 lbs	9.31	76.69
Average of 24 miscellaneous soils (1916 report)..........	.22 4400 "	.11 2200 "	.27 5400 "	.25 5000 "	9.85	81.23
Average of 8 miscellaneous soils. (1916 report).........	.2 4000 "	.12 2400 "	.28 5600 "	.36 7200 "	8.21	79.16
Average of 10 soils from Queens & Lunenburg Counties......................	.28 5600 "	.12 2400 "	.25 5000 "	.24 4800 "	10.39	73.76
Average of 8 soils from Stewiacke Valley..............	.24 4800 "	.16 3200 "	.34 6800 "	.59 11800 "	8.0	78.97
Average of all the above...	**.24 4800 "**	**.13 2600 "**	**.32 6400 "**	**.37 7400 "**	**9.15**	**77.96**
*Average of 9 Alberta soils...	.44 8800 "	.16 3200 "	.42 8400 "	.7 14000 "	12.	
Average of 194 Massachusetts soils.................	.28 5600 "	.21 4200 "	.25 5000 "	.67 13400 "		
Average of a number of Oregon soils..............	.15 3000 "	.24 4800 "	.29 5800 "	1.79 35800 "		
Average of 200 United States fertile soils................	.29 5800 "	.24 4800 "	.29 5800 "	2.16 43200 "	7.00	79.95

*Taken from Prof. Shutt's report but made approximate by allowing for 5% of water since his analysis is based on water free soil, ours with air dried soil.

Section 6.

Lime requirement of Soils.

There is going on in the soil a contest for supremacy between base or alkali and acid material. When the former is in excess, we have the alkali soils of the west when the latter, the sour soils, found especially in swamps. When the alkali or base material comes in contact with the acid, there is a union of the two and the soil becomes as we say neutral or sweet, the base becoming inactive. The base constituents of the soils wash out more readily than does the acid; the decay of leaves, manure etc. always produces acids, which unite with the alkali and so use it up. Moreover, plants take up more base elements than acid from the soil.

The tendency of the soils of this province is to lose the bases faster than the acids, either by water carrying them away or by the uniting with the acids, so we often hear of sour soils, that is those in which free base constituents are lacking. It is a fact that most crops do their best on soils where the base elements are in excess. This today is so widely recognized that substances are being added to help the soil maintain the excess of base, which excess is known as active or free base.

Limestone and its products, burnt lime, slacked lime and allied material, as wood, ashes and slag, are the only materials which can economically be used for meeting this demand of the soil. The amount of such material figured as limestone 90% pure, needed to keep the soil so that bases are in excess, is called the lime requirement. This factor now recognized as one of the essentials in soil analysis, has been obtained for 159 soils, taken from every part of the province.

The results show about as follows in a few of these:—

Inverness soils	5.7	tons per acre
24 unlimed Stewiacke soils	3.6	" " "
8 limed one year before, Stewiacke soils	2.5	" " "
15 Queens and Lunenburg soils	4.	" " "
a number from Queens and Lunenburg Cos. limed one year before	3.	" " "
a number of black swamp soils vary from	8 to 45	" " "

Aside from the last group of soils we can say that our average requirement of ground limestone is about 5 tons per acre.

Why is it that when the test is made one season the need is found to be 4 tons per acre, while after application of this amount, the next season shows the need yet to be three tons per acre? Provided the ground stone was well mixed with the soil by harrowing, this is explained by taking a handful of the soil and adding a little acid; particles of it will bubble, showing that the large particles of stone are still in the soil, being only partly acted on. These larger particles should be effective to some extent the next season. If quick results from lime-stone are needed, this emphasizes the importance of havingthe stone finely ground. Several samples have been mechanically analyzed and show as follows:—

TABLE IX

Mesh Sieve		War brand slag	N. S. Limestone ground No. 1.	Solvay Co., Syracuse, N. Y., No. 2	Sturtevant Mill Co., No. 3	Limestone No. 4, N. S.
Left on	16	5.37%	24.57%	0%	9.6%	51.31%
	26	6.45	10.07	8.1	10.5	14.02
	64	10.74	11.7	26.52	12.	9.40
	130	10.74	6.11	......	7.2	3.77
Passed	130	66.66	47.46	65.37	60.9	21.49

In 1914 pot experiments with fine limestone gave us much better results than with an equal quantity of the coarse. This question has been carefully reported on by Kopeloff in Soil Science, July 1917, as follows:—

1. An increase in fineness of division of pulverized limestone from 20 to 40, 60 to 80, 100 to 200, to finer than 200 mesh, is responsible for a proportional increase in the yield and total nitrogen content of crimson clover on several soil types and for a corresponding decrease in lime requirement.

2. From the above standpoint there was little choice between burnt lime and 200 mesh limestone.

3. An increase in finess of division of pulverized limestone is responsible for an increase in the activity of the bacteriological processes of ammonification, nitrification, and nitrogen fixation, as measured in soil and solution.

The Pennsylvania Agricultural College, from experiments says; "We conclude, therefore that on silty loams and on soils of heavier texture, on lands where soil acidity is the chief factor limiting clover production, crushed limestone used for amendment should be at least 60-mesh in fineness of pulverization."

In soils so much in need of quick action of limestone, the above table is important, since it shows which product can be expected to show results the first year or two. The use of burnt lime has been much discounted. It is safe to say that with proper slaking and distribution of burnt lime, there can be very little ill effect since the fine particles soon become carbonated or changed from the lime to the limestone; further that the samples of Nova Scotia ground limestone are much too coarse.

Section 7.

Muds.

The soils of this section include the swamp soils, very high in organic matter which gives them a dark color and soft spongy feeling and the muds found along the rivers and bogs.

As in previous years many enquiries are received about such material and the following have been more or less fully analyzed, and results shown in Table X;—

419b J. A. McLean, Newtown, Guysboro, Swamp soil.
448 J. J. Sampson, River Burgeois, Sea mud.
450 C. D. Clarke, Scotch Village, Hants Co., from bog 20 ft. deep.
452* Black Bros., New Glasgow, Marsh along river.
458 Aylesford, Kings Co., Bog.
462 Frank Miller, Gardner Mines, C. B., from mud flats.
466 Emery D. Smith, Shelburne, taken 7 inches deep from a bog.
483 Rev. A. H. Cormier, Larry's River, Guysboro, salt water mud.
525 T. J. Hanifan, Cloverville, Antigonish Co., very sour bog soil, very deep.
560 J. M. McAulay, Millville, C. B., swamp soil.
573 W. L. Burgess, South Maitland, quite a large deposit of porcupine manure found in plaster caves.
574 Upland peaty soil overlying plaster, W. L. Burgess, South Maitland.
585 Paul T. McKay, Earltown, Colchester Co., bog soil.
586 G. M. Bezanger, Sydney, swamp soil.

See table III for physical analysis.

The higher these materials are in organic matter the higher the nitrogen, although unless well decayed the nitrogen is not available. In a sour, wet swamp, decay cannot go on. No. 525 is very sour although there is over 5% of lime. This illustrates the fact that the lime in a soil may be held by organic acids resulting from decay and not be free for keeping the soil sweet. The potash in any swamp soil is lacking, but in the muds laid down in the rivers and harbors the mineral matter gives a good percentage of potash. Invariably such muds are more complete as far as plant food is concerned than the swamp soil. In other words a swamp soil is composed of layers of decayed plants with more or less wash of mineral matter, while the muds are largely clay and sand carried by the water and mixed with more or less remains of plants and animals.

TABLE X.

Organic Soils and Muds.

No.	Nitrogen	Phosphoric acid	Potash	Lime	Magnesia	Water in air dried samples.	Volatile matter mostly organic	Insoluble Silica	Soda	Iron oxide and Alumina	Lime aequirement Tons per acre carbonate of lime
419b	2.05	.63	....	.7	.43	9.6	55.7	28.15	....	4.17	15.
448	.25	.14	.7	.6	.65	2.05	8.	79.16	1.32	6.8	1.
450	.71	.48	.07	.2	....	8.25	67.1	4.81	.18	16.	37.
452	.27	.12	.81	.7	.97	1.6	10.75	74.48	1.24	9.2	.5
458	1.12	.2	....	.4	....	.....	92.35	4.45	....	2.5	....
462	.14	.19	.46	1.4	.57	1.75	5.35	82.24	.53	6.5	....
466	1.61	.63	....	.3	....	10.7	55.8	29.8	....	31.	33.
483	1.37	.47	.41	1.	.9	14.5	59.	15.75	1.64	3.53	....
525	1.18	.31	.09	5.4	.25	20.66	68.12	3.79	.07	.78	....
560	1.46	.25	....	1.8	....	15.15	65.55	12.1	....	3.55	....
573	1.36	.25	.19	4.6	...	*47.38	21.1	21.3	.15	2.25	....
574	1.67	.13	.11	.8	.36	16.1	72.95	6.43	.17	1.47	....
585	1.09	.38	....	.4	....	8.9	30.05	59.1	....	.82	....
586	.59	.25	....	.4	....	9.	55.	34.4	....	.75	....

* Water in sample as received.

Section 8.

Marl.

While on field work in different parts of the province, attention has been given to marl deposits, encouragement has been given to farmers to report any deposits which might be of this nature. The following samples have been analyzed.;—

TABEE XI.

No.	Place	Owner	Carbonate of Lime	Carbonate of Magnesia
416	Parrsboro.............	R. Kirkpatrick......	30.35	
417	Stewiacke............	S. P. Creelman......	41.50	.6
420	Margaree	J. M. Murphy......	(a) 71.42	
			(b) 64.28	
			(c) 8.48	
			(d) 83.92	
424	South Maitland.......	Per H. O. McLatchy	66.07	
434	Harvard Lake, Inv. Co.	J. R. Miller	86.6	
449	East Margaree........	....	22.5	21.5
478	South West Mabou ...	A. A. McDonald....	40.2	4.5
508	Frizzleton, Inv. Co.....	A. E. Ingraham.....	(a) 17.50	7.56
			(b) 24.39	13.23
517	St. Joseph's, Inv. Co...	John Chaisson......	10.71	4.15
519	Harvard Lake.........	Mr. Murphy........	34.8	8.3
551	N. E. Margaree.......	....	71.42	
572	South Maitland.......	W. L. Burgess.......	(a) 38.	
			(b) 44.	
			(c) 62.8	
575	Margaree Forks.......	M. J. Cameron	(a) 84.82	
			(b) 54.46	37.
623	Middle River, Vic. Co..	L. McLeod.........	35.71	7.93
642b	Gillisdale, Inv. Co.....	R. D. G. Gillis......	53.57	37.42

These materials are of value according to the amount of total carbonates. As found they contain about 15% of water which increases the cost of transportation. They are as good as limestone when equal percentages of the dry material are used and when equally as fine.

Section 9.

The investigation of the limestone deposits is continued this year. This is considered as work preliminary to the grinding of limestone in sections remote from the railway, by the use of portable machines. Most of the samples are high grade, that is over, 90%. The following table is given:

TABLE XII.

No.	Place	Sender	Carbonate of lime	Carbonate of Magnesia
442	New Glasgow, R. R. No. 2.....	D. A. McKenzie.....	91.51	
425a	Hilden, Col. Co.......	R. H. Kennedy......	84.82	
425b	" " "	R. H. Kennedy....	84.37	
426a	Rich. Co......	Rev. R. L. McDonald	89.28	
426b	" "	Rev " "	87.5	
426c	" "	" "	49.55	9.45
436a	Up. Stewiacke, Col. Co.	Murdock Henry.....	96.42	
436b	" " " "	" "	90.17	
437	Hunter's Mt., Vic. Co..	H. G. Matheson	77.44	
438	West River, Pictou Co.	J. McG. Fraser......	97.0	
439	St. Anne's, Vic. Co....	Smith Bros.........	92.7	
440	" " " "	" "	70.5	
441a	Belle Cote, Inv. Co....		64.3	2.0
441b	" " " " ...		81.25	
441c	" " " " ...		86.6	2.0
441d	" " " " ...		86.6	1.5
442a	Margaree Forks.......		93.7	
442b	" "		61.6	30.0
442c	" "		89.28	
442d	" "		95.53	
443a	" "		86.8	
443b	S. W. Margaree.......		83.0	
444a	Dunvegan, Inv. Co....	D. J. McLeod	81.3	12.0
444b	" " "	"	75.9	20.0
444c	" " "	"	74.1	
445a	" " "	"	59.9	27.0
445b	" " "	"	81.3	
447	Oxford, Cumb. Co.....	D. J. Wood.........	12.5	
			(Also 83% sulphate of lime)	
453	Sunny Brae, Pic. Co...	A. C. Tattrie........	95.5	
459a	Elmsdale, Hants Co....	Stewart McPhee.....	98.2	
459b	" " " ..	" "	94.8	
465	Port Hood, Inv. Co....	Alex. Hawley.......	67.0	25.0
473a	N E Margaree Inv. Co:	J. A. Burton........	56.25	39.25
473b	" " " "	" "	55.3	39.0
479	Up. Stewiacke, Col. Co.	Jas. Creelman	62.5	
485	Lanesville, Col. Co.....	G. F. Chaplin.......	91.07	
489	Up. Stewiacke, Col. Co.	Chas. Graham......	62.5	
518	St. Joseph du Moines, Inv. Co......	John Chaisson......	56.54	39.81
523a	Gillisdale, Inv. Co.....	G. F. Chaplin.......	55.35	37.8
523b	" " "	"	97.3	
523c	" " "	"	50.89	37.04
529a	" " "	"	97.32	
529b	" " "	"	92.85	
529c	" " "	"	92.85	
530	Inverness Town.......		75.89	2.2
551b	N. E. Margaree.......	"	81.25	
556	Guysboro.............	A. B. McDonald....	91.0	
557	Mabou Island, Inv. Co	A. A. Campbell.....	78.57	17.0
562a	Glenora Falls, Inv. Co.	A. D. Beaton.......	71.4	25.0
562b	" " " "	"	96.4	1.0
566	River Phillip, Cum. Co.	Blair Fillmore	95.15	
569	Beaver Brook, Col. Co.	Leonard Johnson....	85.71	
578	Penny's Mt. Col. Co...	Scott Clifford.......	89.3	
596	Clarkesville, Hants Co.		98.21	
598	Port Hastings, Inv. Co:	G. F. Chaplin.......	85.71	
959	Windsor, Hants Co....	H. C. Burchell......	94.64	

TABLE XII—(*Continued*).

No.	Place	Sender	Carbonate of lime	Carbonate of Magnesia
612	Beaver Brook, Col. Co.	Isaac Allan..........	93.75	
614	Brookfield, Col. Co....	T. D. Bates..........	86.6	4.87
622a	Baddeck Forks, Vic. Co		80.35	18.14
622b	Middle River, Vic Co..		74.1	
622c	" " " "		65.17	33.85
622d	" " " "		87.5	6.42
623a	" " " "		88.39	
623b	" " West "		93.75	
640a	N. E. Margaree, Inv Co.		71.43	
640b	" " " "		88.39	
640c	" " " "		88.39	
640d	" " " "		68.75	13.98
641	Dartmouth, Hfx. Co...	E. J. Butcher.......	52.67	34.69
642a	Gillisdale, Inv. Co	R. D. J. Gillis.......	67.85	28.11

Part C.

Investigation.

The chief line of work carried on this year was with limestone in order to determine its effect on a wide variation in soils and also by operating a grinding machine in a section remote from railway facilities to get some idea of the cost of preparing the ground stone.

Upon the earnest solicitation of the farmers of the Margaree Valley, Inverness Co., it was decided to place a machine there for the season of 1917. Mr. G. F. Chaplin of Stewiacke was engaged to place and operate his "Jeffrey" limestone pulver in that section all expenses being borne by the Department of Agriculture, the farmers to quarry the stone, bring it to the crusher, and pay one dollar and twenty-five cents per ton.

The machine was loaded on the car at Brookfield, Colchester Co., May 25th, the expense beginning at that time.

Reports of the work are complete to Nov. 10th. The following summary shows the cost of the stone outside the quarrying.

Total cost..........................	$1918.81
" tons ground....................	940
Cost per ton.......................$	2.04

With what is considered to be a fair charge for quarrying 50c per ton added, the cost of preparing the ground limestone would be $2.54.

In reaching this conclusion it is only fair to state that the cost is much higher than it would be were the machine owned and operated by private parties or what would be better still, by the eight Agricultural Societies in the Margaree Valley, working in co-operation. In the first place the remuneration to the owner and operator of the machine is greater than the wages of a mechanic plus the interest on an investment of about two thousand dollars would be. The cost of transportation of the machine from Brookfield to Gillisdale, where the work started was one hundred and twenty dollars; this is charged againt the machine for the season of five months. Further for two weeks during August, the farmers being busy with hay, the machine was idle so the operator and his helper were given travelling expenses to Truro and return. During the latter part of October, while the machine was at Belle Cote, the fisherman-farmer thought it more remunerative to attend to fishing than to quarrying limestone, so the machine did not have the rock in sufficient quantity to keep it busy.

The work was started at *Gillisdale*, then the machine was moved to the following places:—

South-west Margaree	McLellan's quarry.
" " "	McDonald's quarry.
Margaree Forks	Cameron's quarry.
East Margaree	"The slide."
Belle Cote	Aucoin's quarry.
North-east Margaree	Tompkins' quarry.

This necessitated a move six times, covering a distance of forty miles. The aim has been to get as many as possible to use the stone. In some cases it was necessary to limit some parties in the amount taken. There were 114 who used the stone in quantities varying from one-half a ton to twenty-four tons. Were the ground lime-stone used in any one of these sections as it should be, the machine could be busy six months steadily grinding about 1500 tons or more. The expense of moving has added very much to the cost of the stone.

The fuel used was kerosene oil which has increased within the year from 13½c per gallon to 18c, and costing landed at the crusher about 23c per gallon; this was in some cases hauled long distances or when running short of supply, bought locally at a much higher price.

As expected, weather conditions after November 1st were against both quarrying the stone and operating the machine in the open.

The reports of the week ending September 15th, when conditions were the most favorable, and October 27th, when the least, will give an idea of the relative cost.

Week Ending September 15th.

	Amount ground per day		Wages
Monday	28,100 lbs.	11 hrs.	$8.80
Tuesday	30,000 "	11 "	8.80
Wednesday	32,000 "	11 "	8.80
Thursday	28,000 "	11 "	8.80
Friday	24,000 "	11 "	8.80
Saturday	16,000 "	6 "	4.80
		4 "	1.60
		No work for 4 hours	
		Helper	9.18
	158,100 "		$59.58

Week Ending October 27.

	Amount ground per day		Wages
Monday	Rain all day		$4.00
Tuesday	15,000 lbs.		7.20
Wednesday	No rock		4.00
Thursday	Rain		4.00
Friday	8,000 lbs.		3.20
Saturday	No rock		4.00
		Helper	9.18
	13,000 lbs.		$35.58

When conditions were good the cost, as far as labor is concerned, of 79 tons was $59.58 or 75c per ton. When under the worst conditions the cost ran up to $3.00 per ton.

While it is impossible to state from the present experiment what ground limestone would cost when produced commercially our experiment is designed to show what the farmers can prepare it for when working co-operatively. Conditions vary so much in different sections of the provine that it might be expected that the cost would vary; in the Margaree Valley and as far down as Belle Cote limestone should be quarried and ground by the farmer for $1.50 per ton.

Pot Experimental Work.

A series of fertilizer experiments was carried on this season on three different soils in pots. Glazed crocks 9″ in diameter, with a hole punched in the bottom for drainage, were used. The crop grown was oats. The soils used were:

(a) Clay loam from the farm of J. H. Fancy, Kempt, Queens Co.

(b) Muck soil from the farm of Norman Cruikshank, Elderbank, Halifax Co.

(c) Muck soil from the farm of J. C. Tory, Guysboro.

The two muck soils besides being experimented on by themselves were also used to test their value as fertilizer on the clay loam soil. They are designated in the table of results as Muck (c) and Muck (T).

The pots were kept as nearly identical with field conditions as possible, being left out of doors all the season. The crop was sown on June 1st and harvested on August 24th. The following are the results in order of merit:—

TABLE XIII.

Lot "A"

Queens Co. Soil.

No.	Fertilizer used	Amount	Yield of threshed grain per acre.
1.	Kelp and rock phosphate	Kelp 30 tons per acre Rock Phos. 1 ton per acre	56.6 bushels.
2.	Muck (c) and liquid manure	a liberal top-dressing of muck with all the liquid manure it would absorb.	53.2 "
3.	Kelp (sea-weed)	30 tons per acre	44.6 "
4.	Eel grass (sea-weed)	30 " " "	42.9 "
5.	Muck (c) and basic slag	same amount of muck as in No. 2. slag 1400 lbs. per acre.	41.1 "
6.	Ground limestone	6 tons per acre	36.0 "
7.	"Fiddle Strings" (sea-weed)	30 tons per acre	30.0 bushels.
8.	Muck (c) alone	Same amt. as in No. 2	29.1 "
	Basic slag alone	1400 lbs. per acre.	29.1 "
9.	Stable manure and slag	Manure 20 tons per acre Slag 1400 lbs. per acre	27.4 "
10.	Muck (c) and rock phosphate:	Muck same as in No. 2 Rock phos. 1 ton per acre	25.7 "
11.	Muck (T)	Same amount as in No. 2	24.0 "
12.	Gypsum	An amount equal to 6 tons of ground limestone per acre	22.3 "

TABLE XIII.—(*Continued*)

No.	Fertilizer used	Amount	Yield of threshed grain per acre.
13.	Check	No fertilizer used.	18.9 "
	Stable manure	20 tons per acre	18.9 "
	" " and rock phosphate	manure 20 tons rock phos. 1 ton	18.9 "
14.	Rock Phosphate	1 ton per acre	15.4 "
15.	Rockweed (seaweed)	30 tons per acre	10.3 "
	Lot "B" (Cruikshank's muck.)		
1.	Ground limestone	6 tons per acre	20.6 "
	Muriate of Potash	300 lbs. per acre	20.6 "
2.	Rock Phosphate	1 ton per acre	18.8 "
3.	Gypsum	Same amount as in No. 12, Lot "a"	15.4 "
	Check	No fertilizer used	15.4 "
	Lot "C" (Tory's Muck)		
1.	Ground limestone	6 tons per acre	29.1 bushels.
2.	Check	No fertilizer used	18.8 "

It is unwise to form too hasty conclusions from these results but as far as the work has been carried it would seem to point towards the following facts:

1. That our native sea-weeds have considerable value as fertilizer, kelp being the best.

2. That our natural deposits of muck are of more value as top-dressings for soil or as stable absorbents than for growing crops as they naturally exist.

3. That such mineral fertilizers as basic slag and rock phosphate give much better returns when applied along with such organic materials as manure, sea-weed and muck than when applied alone.

4. That ground limestone, even when applied alone, on such soils increases crop production to a marked degree.

5. That gypsum does not seem to give much result.

The only results which seem to be rather contradictory are those from stable manure, alone and with rock phosphate. It will be noted that they gave no better yield than the check which had no fertilizer. We are at a loss to explain these.

This work will be continued next year.

Conclusions from Soil and Fertilizer Work in 1917

The work of the Agricultural Chemist is to analyze quite a variety of material. When a report such as this is made there may be a tendency towards scrapiness. To avoid this the results are dealt with in sections and the following general statements made:—

1. In examining Tables IV, V, VI, and VII comparison should be made with the following standard:—

Substance	For a good soil there should dissolve in acid.	Lbs. per acre	of this there should be available.	Lbs. per acre
Nitrogen	.2%	= 4000	2.%	80
Potash	.3%	= 6000	½ of 1%	30
Phosphoric acid	.1%	= 2000	1.%	20
Lime	.5%	= 10000	Soil should not as a rule be acid.	
Organic matter	7.0%			

2. The soils of the part of Inverness County studied are as a rule, naturally among the best in the Province and especially well suited to grain and hay; those from the Stewiacke Valley are much the same, although the amount of potash is less since there are none of the older potash bearing rocks near this valley and the amount of lime is greater due probably to the fact that the steeper hills at Margaree favor the more rapid washing of the limestone from the soil. Table IV and VI.

3. A *partial* study of Queens, Lunenburg, Hants and Victoria Counties, Table V, shows soils of the first three Counties containing more gravel and coarse sand, less potash and lime. There are no limestone formations in the part of the first two counties studied and the clay which carries the potash has been washed away after having been deposited by the glaciers. Those *soils* from near Windsor and Victoria Co. are more like those from Margaree and Stewiacke.

4. Table VII contains results on soils varying from the fine sandy well cultivated soil of Yarmouth to the uncultivated coarse sandy soil of the Springhill coal formation and the shingly slate of Halifax City market garden soil. Soils as numbers 618 and 552 show the lack of organic matter in land pastured for some time; number 570 shows the accumulation of phosphoric acid resulting from the generous use of city stable manure.

5. Table VIII summarizes the results of our analysis and by comparing with figure from other parts of the continent shows that our soils have potash in good quantity. The supplies of nitrogen and phosphoric need to be attended to, although they, especially the nitrogen, are not far below other provinces and states. The amount of lime is much lower than elsewhere.

6. The problem of handling soils so as to give the best yields is complicated at any time but with a scarcity of commercial fertilizers there are new questions. Emphasis must be put on the following:—

(a) Know your soil and handle it so that you may get out of it some of the *natural fertility* as the potash and nitrogen. This involves increasing the organic matter, the decay of which is known to set free potash, by the use of manure, sea-weed, green manures, especially clover and vetch.

(b) Use every local fertilizing material as sea-weed, fish scrap, composted weeds, straw and plant stalks, limestone, gypsum, etc.

(c) Apply commercial fertilizers of the right kind. There are low grade materials on the market; it costs as much to transport a ton of poor stuff as a ton of the high grade.

7. The problem of better soil is to quite an extent the problem of cheaper lime. Provided a soil is drained, lime does help the growth of clover; this means when the yield is 2 ton per acre, 60 lbs. of nitrogen at 25c per lb. or $15.00 per acre from the air; it also means more organic matter added to the land. Soil number 600, Table V gave two good crops of alfalfa in the season of 1917. One ton of such hay means 50 lbs. of nitrogen largely taken from the air. *Finely* ground limestone and proper drainage will help build up a soil.

8. Since it does not pay to transport limestone long distances it is hoped that farmers living near limestone crushing plants will do their best to use the material at least experimentally. This increases the demand and helps to bring down the prices. Further it is hoped that farmers remote from the railway as in the Stewiacke valley, Margaree valley, etc. may co-operate through their agricultural societies in grinding limestone just as they do in improving their stock. This is being done elsewhere.

The chemical department at the present time fully recognizes its place in assisting in the production of as much food as possible as cheaply as possible.

During the year, you, Sir, have been ready to advise and assist us in our work in every way possible, so, in concluding this report we wish to thank you.

Respectfully submitted,

L. C. HARLOW.

PART 9—WOMEN'S INSTITUTES

Prof. M. Cumming,
Secretary for Agriculture.

Dear Sir:—In presenting the Fifth Annual Report of the Women's Institute of Nova Scotia, I am sorry that it must be in the light of a partial report as many of the Institutes have not, as yet, forwarded complete reports of the year's work. As I am arranging to prepare during February a record of the progress of the Institutes since their inception with a short history of each Institute, possibly this report will not require to be so definite as formerly.

Owing to our decision not to push any organizing campaigns during the war—a decision which has proven wise—I have only one new Institute to report. This Institute was organized at Williamston, Annapolis Co. on May 26th at the request of the ladies of that place. This brings our number of Institutes up to fifty and the total membership will reach very nearly seventeen hundred. The average membership is 35, the average number of meetings held 12, without taking into account public meetings and the attendance as in the past, averages easily two thirds of the membership.

Ever since the war broke out the Institutes have put forth every effort to assist all patriotic causes that have been the outcome. Thousands of dollars have been contributed each year and this year will increase the giving, judging from the reports now in. I am glad to state that many of our smaller Institutes have increased their donations of money as well as sewing and knitting. The Institutes have been particularly generous in the matter of socks, thousands of pairs being sent overseas. In many cases the yarn used has been spun by the women themselves, who also donate the wool. Almost every Institute remembered the boys when putting up their fruit and jars of all kinds of jam were donated in large quantities and at Christmas, boxes and stockings containing appropriate gifts were forwarded to cheer the hearts of our boys and remind them that we had not forgotten.

Besides all forms of patriotic work, the work that lies near at hand in every community was not neglected. Much has been done toward further improvement of the sanitary condition of the schools and improving the general appearance of both schools and their surroundings. More interest s being taken in school fairs and the boys and girls are encouraged to grow more vegetables and flowers, the interest being stimulated by the offer of small prizes. Manual Training classes for boys and Sewing Classes for girls have been organized, the Institutes bearing all expense and in the case of the Sewing Classes the Institute members undertake the teaching of the sewing. The interest in these classes have also been stimulated by the offer of small money prizes. The poor we have always with us and the Institutes have not neglected those in want in their communities and many homes have been aided by substantial donations of food and clothing and some of the inmates of our country poor houses have been substantially remembered at Christmas time. In short, wherever the Institutes saw the necessity of assisting in their communities, they have hastened to offer a helping hand and the origin of many needed reforms can be traced to the Women's Institute.

The Annual Short Course held at the Science Building, Truro, during the first two weeks of January, 1917, was one of the best we have ever given and the most largely attended. The morning attendance averaged between fifty and sixty and the afternoon attendance ran well over one hundred. A second Short Course was given at Lawrencetown, Annapolis County from May 21st to May 26th, which was very well attended considering weather conditions, which were anything but good. This Short Course has proved so popular that it promises to be an annual affair. During the summer demonstrations were given in Canning of Fruits and Vegetables and literature on the subject distributed. At the Provincial Exhibition in Halifax, daily demonstrations in Canning were given, which were splendidly attended and several thousand pamphlets in Canning were distributed

In November, I visited the Institutes in Yarmouth and Digby and found them in a flourishing condition and the members very much interested in the work of their individual Institutes.

Before closing I must again seize this opportunity of thanking the various branches of the Department for their unfailing interest in the Women's Institute Branch and for the kindness and courtesy with which I have been treated since my connection with the staff and particularly to the Secretary for Agriculture for his assistance in any scheme proposed for the advancement and development of the Women's Institutes.

JENNIE A. FRASER,
Superintendent of Women's Institutes
of Nova Scotia.

PART II

Prof. M. Cumming,
Secretary for Agriculture.

Sir:—I have the honor to submit my eleventh annual report for Agricultural Societies.

Of the two hundred and sixty-three societies which participated in the grant last year, twelve failed to reorganize this year. Eighteen new societies were organized during the year and two resuscitated, making a gain of eight societies or a total of two hundred and seventy-one societies duly qualified for the next year's grant.

The increase in memberships is four hundred and fifty-one and the amount subscribed is $1,660.86 larger than last year.

Owing to the large annual increase in the amount subscribed and the fact that the grant remains stationery the percentage of grant received by the societies has gradually decreased until this year, after the $40,00 for each society was deducted the amount left to be divided amounted to only 27% of the surplus amount subscribed. In this connection the Nova Scotia Farmers' Association, composed very largely of delegates from Agricultural Societies, passed a resolution asking the Legislature to increase the grant to $20,000.00. In view of the much larger amount subscribed and the very much better quality of sires purchased by societies the request seems a reasonable one. The Nova Scotia Farmers' Association also passed a resolution stating that in their opinion the time had arrived when Agricultural Societies changing from one breed to another without consulting the Department of Agriculture should forfeit their claim to any share of the Provincial Grant.

Both of these matters will be brought to the attention of the next session of Parliament with a view to securing effective legislation.

The extra work in connection with the Halifax Board of Trade Competition and the Field Crops Competitions and Exhibitions made it impossible for me to visit very many societies during the year. This is offset by the fact that during the last ten years I have become acquainted with a number of reliable men in every section of the Province and keep in touch with Agricultural society work while going through the Province on other missions.

An Act having an important bearing on Agricultural Society work was the one passed at the last session of the Legislature penalizing the use of "Scrub Sires" in Agricultural Society districts. The benefit of this legislation has already been demonstrated in several sections.

The greatest hindrance to live stock improvement today is the practice of Agricultural Societies disposing of sires (regardless of their merits) soon after they reach mature age and replacing them with younger animals. In defence of their methods Agricultural Societies claim that these animals either become unsafe or inactive. To overcome this we offered, some years ago, a grant of $10.00 to Agricultural Societies that constructed a paddock for exercising their bulls. Later we offered to stand the expense of arranging the exchange of sires of proved merit. Both of these offers are open to all Agricultural Societies at the present time and it would be hardly fair to say that they have been a failure, however, we are still far short of the desired goal. While the ablest live stock men in all countries have devoted their best efforts to the preservation of the proved sire the practice of letting them go to the block while comparatively young still goes on. While we have records of "World Famous" sires I do not think I am exaggerating when I say there are many animals sacrificed every year which would have made equal records if given an opportunity. The question is so important that it must continue to occupy our best efforts. Realizing that one of the most important factors in preserving these animals, both in active use and disposition, is exercise we have, in order to encourage the practice, offered a bonus of $25.00 to Agricultural Societies which construct a paddock where the animal has a "Shed" or "Box Stall" in a building where he can run in and out at will. Much of the value of the detached paddock was lost on account of the bother of putting the animal in and out. Furthermore, they were only put out in fine weather.

Recent experience goes to prove that these animals if given an opportunity, will spend much of their time in the open even in cold weather and be much benefitted thereby. It is hoped that Agricultural Societies will take advantage of this offer and help overcome one of the greatest obstacles to live stock, improvement of the present time.

On the following pages will be found a detailed statement of all the Agricultural Societies which have qualified for the present grant.

Respectfully submitted,

F. L. FULLER.

Previous Record of Agricultural Societies in Nova Scotia.

The fluctuation in the number and strength of Agricultural Societies in the Province during the last fifty-four years is shown in the following table, from which it will be seen that the number of Societies has been increased from the original number of thirty-seven to two hundred and seventy-one, membership from 1,744 to 10,974; subscriptions from $1,859.90 to $22,407.80; and grants in aid from $3,010 to $15,000.00.

Comparative Statement showing the number and strength of Agricultural Societies organized under the Act for Encouragement of Agriculture in each year, for fifty-four years from 1864 *to* 1917 *both inclusive.*

YEAR			No. of Sec.	No. of Memb's	Amount of Subscription	Grants in Aid
1st	Year	1864.............	37	1744	$ 1859 90	$ 3010 00
11th	"	....	64	3971	4495 00	5830 50
21st	"	1884.............	92	5064	6361 59	6835 00
22nd	"	1885.............	88	4592	5225 00	6556 50
23rd	"	1886.............	91	4532	5334 90	6653 00
24th	"	1887.............	85	4432	1571 85	6597 00
25th	"	1888.............	83	3986	4659 47	6361 00
26th	"	1889.............	82	4398	5170 10	6444 00
27th	"	1890.............	81	4152	5257 45	6420 00
28th	"	1891.............	81	4136	5172 29	6432 20
29th	"	1892.............	80	4273	5856 53	6525 00
30th	"	1893.............	81	4068	5051 55	6309 50
31st	"	1894.............	80	4398	4424 55	8000 00
32nd	"	1895.............	83	4597	5356 15	8000 00
33rd	"	1896.............	85	4888	5657 30	8000 00
34th	"	1897.............	89	5238	5997 16	8000 00
35th	"	1898.............	103	6155	7092 90	8000 00
36th	"	1899.............	119	6974	8502 45	10000 00
37th	"	1900.............	131	7362	9322 60	10000 00
38th	"	1901.............	151	8500	10771 53	10000 00
39th	"	1902.............	163	8973	11688 43	10000 00
40th	"	1903.............	172	9444	13209 65	10000 00
41st	"	1904.............	166	8426	11634 80	10000 00
42nd	"	1905.............	164	8398	11888 90	10000 00
43rd	"	1906.............	166	8498	12900 51	10000 00
44th	"	1907.............	160	7849	15015 40	10000 00
45th	"	1908.............	167	7596	11284 77	10000 00
46th	"	1909.............	179	8090	12158 95	10000 00
47th	"	1910.............	187	8315	12732 45	10000 00
48th	"	1911.............	200	8567	13137 45	10000 00
49th	"	1912.............	205	8503	13256 73	10000 00
50th	"	1913.............	219	9248	16799 03	15000 00
51st	"	1914.............	226	9769	17869 11	15000 00
52nd	"	1915.............	247	10315	19788 81	15000 00
53rd	"	1916.............	263	10523	20764 94	15000 00
54th	"	1916.............	263	10523	20764 94	15000 00
54th	"	1917.............	271	10947	22409 80	15000 00

STATEMENT OF SOCIETIES FOR 1917.

There are two hundred and seventy-one Agricultural Societies in the Province which have qualified for participation in the grant for 1917. Twelve of the societies reported last year failed to qualify and eighteen new societies have been added and two resuscitated.

The following list shows the total number of members of the societies in each country, the total amount of subscriptions duly declared to, according to the provisions of the Act, as paid by the members within the year, and the total amount of grant qualified for by the several counties.

COUNTIES	No. of Societies 1916	Number of Members	Total Amount Subscription	Total Grant in Aid
Annapolis..........	26	965	$ 2550.85	$ 1452.72
Antigonish..........	29	807	2064.96	1407.20
Cape Breton........	9	294	906.20	509.21
Colchester..........	22	846	1919.00	1163.81
Cumberland........	19	657	1259.50	896.45
Digby..............	8	563	871.10	470.55
Guysboro...........	12	485	722.45	546.23
Halifax.............	7	257	613.00	370.97
Hants	14	542	1496.50	815.82
Inverness	19	712	1154.64	867.80
Kings...............	14	669	1580.15	838.68
Lunenburg.........	25	1547	2243.00	1339.55
Pictou..............	30	888	2100.95	1446.11
Queens.............	5	160	312.00	230.61
Richmond..........	19	727	1085.00	848.79
Shelburne..........	2	123	134.75	94.96
Victoria............	7	156	386.00	308.96
Yarmouth..........	4	576	1007.75	391.59
	271	10974	$22407.80	$14000.00

LIST *of Agricultural Societies organized under the Acts for Encouragement of Agriculture with* (1) *names of principal officers*; (2) *number of members*; (3) *amount of subscriptions officially declared to in the terms of the Acts as paid*

ANNAPOLIS COUNTY.

Annapolis Royal.—President, W. A. Marshall, Annapolis Royal; Vice-President, R. H. Hardwick, Annapolis Royal; Secy-Treasurer, Geo. L. Cain, Annapolis Royal; Directors, J. G. Cameron, B. Willis, F. J. Balcom, H. Munroe, F. J. Balcom; Auditors, A. H. Harris, Geo. Hardwick..

Brooklyn.—President, C. A. Neily, R. R. I., Middleton; Secy-Treasurer, C. E. Wright, R. R. I., Middleton; Directors, J. O. Neily, J. O. Stevenson, R. R. I., Middleton, P. F. Young, L. P. Bruce, Caleb Slocomb, R. R. I., Clifton; Auditors, Melbourne Whitman, Aubrey Neily...........

Bridgetown.—President, S. F. Proll, Bridgetown; Vice-President, E. M. Foster, Bridgetown; Secy-Treasurer, Harry I. Patterson, Bridgetown; Directors, A. Phinney, K. Lawrence, M. P. Chute, J. S. Moses, S. F. Pratt, Bridgetown..

Clarence.—President, A. P. Ramsey, Clarence; Secy-Treasurer, A. J. Wilson, Clarence; Directors, Avard Jackson, A. C. Chute, J. W. Elliott, C. H. Jackson, Stewart Leonard, Clarence; Auditors, Albert Banks, Eldon Marshall.......

Clarence, West.—President, S. L. Marshall, Clarence; Vice-President, John Myers, Clarence; Secy-Treasurer, Wm. R. Miller, Clarence; Directors, A. T. Marshall, W. N. Stronach, Judson Chute; Auditors, E. B. Miller, W. N. Stronach.......................................

Clementsvale.—President, Albert S. Brown, Clementsvale; Vice-President, Jas. H. Robinson, Clementsvale; Secy-Treasurer, Leslie M. Baird, Clementsvale; Directors, Edward Potter, Ralph Potter, Asa Potter, Geo. Ramsay, Lenley Sproule..............................

Cleveland.—President, D. G. Ritcey, Nictaux Falls; Vice-President, C. W. Hoffman, Nictaux Falls; Secy-Treasurer, A. B. Barteau, Nictaux Falls; Directors, H. B. Willett, C. W. Hoffman, M. W. Burns, C. C. Smith, G. C. Whitman, Nictaux Falls; Auditors, C. W. Hoffman, G. C. Whitman..

for 1916; and (4) *total receipts, total expenditure,* (*c*) *balance in hand,* (*d*) *deficit*; (5) *amount of grant apportioned to each society for* 1917, *subject to compliance in other respects with the re uirements of the Act.*

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
26	63 00	46 28	130 86	98 20	32 61
33	54 00	43 82	227 56	183 65	43 91
18	40 00	40 00	159 77	192 90	33 13
51	163 25	73 67	359 26	327 15	32 11
15	110 00	59 12	234 22	186 19	48 03
28	59 00	45 19	285 12	172 50	112 72
54	130 50	64 72	287 97	344 80	56 83

Falkland Ridge.—President, Geo. Roop, Falkland Ridge; Vice-President, Ira Stoddard, Falkland Ridge; Secretary, C. R. Marshall, Falkland Ridge; Treasurer, Percy Starratt, Falkland Ridge; Directors, E. E. Wagner, Anthony Wagner, Percy Starratt, Edgar Oikle, Herman Sproul, Falkland Ridge; Auditors, Emerson Wagner, Ira Stoddard..

Forest Glade.—President, P. D. Bent, Forest Glade; Vice-President, R. C. Smith, Margaretville; Secy-Treasurer, D. A. Downing, Margaretville; Directors, F. Forsythe, Chas. Downing, James Gates, R. Stronach, Margaretville, Lamont Stronach, Forest Glade; Auditors, J. O. Gates, A. D. Gates..

Granville Centre.—President, J. Morrison Wade, Granville Centre; Vice-President, Harry Goodwin, Granville Centre; Secy-Treasurer, Frank R. Troop, Granville Centre; Directors; Archie F. Troop, Clarence Eaton, John Dunn, Reid Willet, Willard Withers, Granville Centre..........

Laurie.—President, J. S. Marshall, Spa Springs; Vice-President, L. R. Archibald, Spa Springs; Secy-Treasurer, A. F. Gordon, Spa Springs; Directors, C. W. Daniels, J. A. Woodbury, Thos. Slack, F. A. Balser, A. F. Gordon, Spa Springs..

Lawrencetown.—President, Arthur Duncan, Lawrencetown; Vice-President, D. M. Balcolm, Lawrencetown; Secy-Treasurer, H. T. Phinney, Lawrencetown; Directors, L. H. Stoddard, F. O. Foster, F. G. Palfrey, W. H. Phinney, Mr. Lilly, Lawrencetown; Auditors, J. E. Schaffner, H. H. Whitman..

Lower Granville.—President, Edgar A. Litch, Granville Ferry; Vice-President, J. V. Robbie, Granville Ferry; Secy-Treasurer, Edward Fairnsworth, Granville Ferry; Directors, Edward Fairnsworth, John VanBlarcome, J. Russel Longmire, Vernon Clarke, Granville Ferry; Auditors, Fred W. Thorne, John K. Winchester.................

Mount Hanley.—President, E. J. Elliott, Mount Hanley, Vice-President, Stanley Barteaux, Mount Hanley; Secy-Treasurer, A. W. Slocomb, Mount Hanley; Directors, I. J. Fritz, H. L. Elliott, R. B. Miller, Mount Hanley, Hallett Daniels, Douglasville; Auditors, Stanley Barteaux, George Rafuse................................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
36	83 00	51 75	188 38	121 21	67 17
76	272 00	103 38	488 23	203 30	284 93
33	186 50	80 02	328 04	325 45	2 59
59	183 00	79 06	282 57	261 90	20 67
47	72 00	48 74	152 00	140 70	11 30
37	63 00	46 27	New	Society	
38	46 50	41 78	208 22	143 15	65 07

Nictaux.—President, G. D. Morse, Nictaux west; Vice-President, F. B. Morse, Nictaux West; Secy-Treasurer, N. M. Beckwith, Nictaux West; Directors, F. B. Morse, A. L. Neily, Irvin Morse, N. M. Beckwith, Nictaux West, C. S. Rogers, Neidvale; Auditors, F. A. Chipman, W. W. Crowford..

Paradise.—President, J. S. Longley, Paradise; Vice-President, Dr. Simmons, Paradise, Secy-Treasurer, R. S. Leonard, Paradise; Directors: L. H. Balcom, J. C. Phinney, J. S. Ritcey, F. W. Bishop, A. P. Behoner, Paradise; Auditors, H. A. Longley, Dr. Simmons......................

Riverview.—President. W. E. Illsley, R. R. I., Lawrencetown; Vice-President, D. M. Charlton, R. R. I., Lawrencetown; Secy-Treasurer, R. L. Moore, R. R. I., Lawrencetown; Directors; W. W. Whitman, D. M. Charlton, Heber Boland, I. M. Hiltz, Lawrencetown; Auditors, I. M. Hiltz, D. M. Charlton...........................

Springfield.—President, Jacob C. Roop, Springfield; Vice-President, J. E. Morrison, Springfield; Secy-Treasurer, Irving C. Mason, Springfield; Directors, C. A. Grimm, Donald Morrison, G. M. Durling, G. A. Durling, A. G. Morton, Springfield; Auditors, Donald Morrison, E. C. Durling...

Stoney Beach.—President, Herman Winchester, Granville Ferry; Vice-President, Holland Snow, Granville Ferry; Secy-Treasurer, W. B. Winchester, Granville Ferry; Directors, Wm Hardy, Rupert Farnsworth, Ansel Orde, Samuel Blaney, W E Armstrong, Granville Ferry; Auditors, G P. Littleward, Leroy Sabean...........................

Torbrook.—President, H. P. Wheelock, Torbrook; Vice-President, Arthur J. Jefferson, Torbrook; Secy-Treasurer, A. Stanley Brown, Torbrook; Directors, J. W. Jefferson, Emerson Wheelock, Aubrey Whitman, Arthur Jefferson, Torbrook, Judson Armstrong, Torbrook Mines; Auditors, Aubrey Whitman, Arthur Jefferson..................

Tupperville.—President, H. E. Bent, Tupperville; Vice-President, F. V. Bent, Tupperville, Secy-Treasurer, C. R. Bent, Tupperville; Directors, L. W. Chipman, W. R. Ingles, J. F. Ingles, Mark Chipman, L. Potter, Tupperville; Auditors, H. E. Bent, J. F. Inglis...................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts	Total Expenditure	Balance
51	118 00	61 31	360 00	110 25	249 75
43	84 25	52 09	186 27	175 44	10 83
49	124 75	63 15	442 77	384 07	48 70
39	86 00	52 57	148 41	183 20	34 79
21	48 50	42 32	208 31	118 00	90 31
23	78 00	50 38	167 55	97 00	70 55
21	82 00	51 47	143 74	107 13	36 61

Union.—President, R. VanDitmars, Deep Brook; Vice-President, J. F. McClelland, Deep Brook; Secy-Treasurer, Robert Spurr, Deep Brook; Directors, Walter Purdy, E. R. Pinkney, Frank Ruggles, J. R. Berry, J. M. Nichols, Deep Brook, Auditors, Walter Purdy, J. M. Nichols . . .

Upper Granville.—President, F. H. Bath, Upper Granville; Vice-President, M. Wentzell, Upper Granville; Secy-Treasurer, A. C. Clark, Upper Granville; Directors, A. D. Phinney, John Bath, R. F. Parker, J. B. Gillis, W. A. Horton, Upper Granville; Auditors, M. Wentzell, W. A. Horton. . . . .

Wilmot Mountain.—President, Israel Banks, St. Croix; Vice-President, Wm. Grant, Port Lorne, Secy-Treasurer, Fred R. Stark, St. Croix; Directors, Chas. Beardsley, Port Lorne, Zac. Hall, St. Croix Cove, Edgar Grant, Port Lorne, Allister Banks, Mount Rose, William Hall, St. Croix Cove. Auditors, George Corbett, David Hall . . . .

Wilmot.—President, M. P. Wood, Wilmot; Vice-President, A. P. Bowlby, Wilmot, Secy-Treasurer, H. R. Price, Wilmot; Directors, G. Margeson, A. L. Wiswell, C. L. Banks J. L. VanBuskirk, Neil Bowlby, L. E. Wotton, Wilmot; Auditors, Gerald Margeson, A. C. Wyatt . . . .

Williamston.—President, Harry Barteaux, Lawrencetown; Vice-President, A. F. Morse, South Williamston; Secy-Treasurer, B. M. Shankel, South Williamston; Directors, W. A. Hunt, J. L. Schaffner, F. A. Randolph, A. H. Bishop, E. C. Schaffner, South Williamston; Auditors, F. A. Randolph . . . .

ANTIGONISH COUNTY.

Afton.—President, Fred R. Irish, Afton; Vice-President, Martin Melanson, Afton; Secy-Treasurer, Harold Irish, Afton; Directors, Willard Connors, Jas. McChesney, Edward Atwater, Hugh Smith, George McChesney, Afton; Auditors, William Landry, Martin Melanson . . . .

Antigonish.—President, Thos. McAmis, Antigonish; Vice-President, D. D. Chisholm, Antigonish; Secy-Treasurer J. C. McNaughton, Antigonish; Directors, Angus Kell, W. C. Crockett, J. R. Crockett, Arthur Girroir, F. R. Trotter, Antigonish . . . .

Number of Members	Amount Subscribed	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
37	86 00	52 57	162 32	126 75	35 57
22	107 00	58 31	243 61	227 79	15 82
50	81 00	51 20	291 76	143 35	148 41
34	80 75	51 13	199 23	294 32	95 09
24	48 85	42 42	154 81	101 35	53 46
16	100 00	56 39	100 00	84 21	75 79
50	66 00	47 10	341 37	205 75	135 62

Antigonish Harbor.—President, Wm. Chisholm, Harbor Centre; Vice President, John P. Grant, Harbor Centre; Secy-Treasurer, Thos. Hogan, Harbor Road; Directors, Archibald McDonald, Harbor Centre, Hugh McNeil, John W. Chisholm, Dan J. McDonald, Dan McAllaster, Harbor Centre; Auditors, William Chisholm, John W. Chisholm . .

Arisaig.—President, A. J. McDonald, Arisaig; Vice-President, Angus A. McDonald, Arisaig; Secy-Treasurer, L. A. Gillis; Directors, A. R. Gillis, John A. McDonald, Wm. McPherson, John J. Ross, J. A. Smith, Arisaig; Auditors, A. R. Gillis, L. A. Gillis . . . .

Beaver Meadow.—President, Norman Grant, James River Station, Vice-President, John J. Chisholm, Bailey Brook; Secy-Treasurer, A. J. McDonald, James River Station; Directors, Wm. McDonald, St. Josephs', Alex. McLean, Addington Forks, H. P. Baxter, Addington Forks, John A. McDonald, James River Station, John Chisholm, Briley Brook; Auditors, Rev. J. C. Chisholm, H. A. McDonald . . . .

Black Avon.—President, Donald McDonald, Black Avon; Vice-President, John D. McDonald, Heatherton; Secy-Treasurer, Alex. A. McDonald, Heatherton; Directors, Dan Kennedy, Black Avon, Wm. McMillan, Black Avon, John A. Mills, D. R. McDonald, Stephen McNeil, Heatherton; Auditors, Donald McPherson, John K. Chisholm . . . .

Clydesdale.—President, J. W. McDonald, Clydesdale; Vice-President, Dan Connors, Clydesdale; Secy-Treasurer, Harry Eadie, Antigonish; Directors, Alex. McDonald, C. Grant, Adam Kirk, John Chisholm, R. McDonald, Clydesdale; Auditors, J. W. McDonald, W. J. Chisholm . . . .

Copper Lake and Middleton.—President, A. W. Hattie, Lake; Vice-President, A. F. Grant, Copper Lake; Secy-Treasurer, Arthur Sutherland, Copper Lake; Directors, D. R. Henderson, E. K. Grant, John Bray, Copper Lake, Garfield McDonald, Jas. D. Stuart, Middleton; Auditors, M. Sutherland, John Bray . . . .

Fairmont.—President, W. J. Walsh, Fairmont; Vice-President, John J. McNeil, Fairmont, Secy-Treasurer, P. D. Hanrahan, Fairmont; Directors, John A. McPherson, Allan Cameron, W. J. Cashen, Fairmont, Thos. Brophy, Brophy's Post Office, Alex, McPherson, Cloverville; Auditors, W. J. Cashen, Dan Cameron . . . .

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
25	44 50	42 13	97 91	75 80	22 11
15	40 00	40 00	80 90	10 00	70 90
39	67 00	47 38	160 08	143 00	17 08
18	50 40	42 84	86 70	136 01	49 31
16	41 50	40 41	199 33	188 13	11 20
24	60 00	45 46	258 41	237 65	20 76
26	40 00	40 00	142 64	82 85	59 79

Fraser's Grant.—President, Ronald S. McDonald, Frasers Grant; Vice-President, Rod. J. McDonald, Frasers Grant; Secy-Treasurer, Alex. Fraser, Frasers Grant; Directors, W. Tate, Simon Perio, Clarence Rogers, A. H. Rogers, Angus McKinnon, Frasers Grant; Auditors, Simon Perio, Ronald McDonald....................................

Georgeville.—President, D. A. McInnis, Georgeville; Vice-President, Dan Fraser, Georgeville; Secy-Treasurer, J. D. McGillvray, Georgeville; Directors, Angus McLean, F. D. Gillis, Rod McDougall, John D. McDougall, D. J. McInnis, Georgeville; Auditors, Dan Fraser, J. D. McDougall...

Glassburn.—President, John J. Chisholm, Glassburn; Vice-President, F. D. Gillis, Georgeville; Secy-Treasurer, Duncan Chisholm, Glassburn; Directors, Roderick J. Chisholm, Angus McPherson, John B. McDonald, Finlay Chisholm, Archibald Chisholm, Glassburn; Auditors, Finlay Chisholm, Rod. Chisholm.............................

Harbor au Bouche.—President, David Benoit, East Havre Boucher; Vice-President, Allan Anderson, East Havre Boucher; Secy-Treasurer, Lucien DeCoste, East Havre Boucher; Directors, Chas. Bouchie, J. T. Crispo, East Havre Boucher, Moses Bran, Cape Jack, Edmund Levanger, Big Hill, W. W. Webb, Havre Boucher; Auditors, J. T. Crispo, Chas. Bouchie............................

Lakevale.—President, D. C. McNeil, Lakevale; Vice-President, J. J. McGillvray, West Lakevale; Secy-Treasurer, Rev. Donald Beaton, Lakevale; Directors, Angus A. McGillvray, Angus McNeil, Dougald McDonald, Dan Wallace, Angus H. McDonald, Lakevale; Auditors, Dan McGillvray, John A. McDougall..................................

Lochaber.—President, Hugh McInnis, Lochaber; Vice-President, John Brown, Lochaber; Secy-Treasurer, J. O'Leary, Lochaber; Directors, J. Polson, W. McDonald, W. Taylor, South Lochaber, Jas. Moore, Collegeville, Chas. Stewart, College Grant; Auditors, J. Polson, J. Moore...

Malignant Cove.—President, D. R. McDonald, Malignant Cove; Vice-President, A. R. McAdam, Malignant Cove; Secy-Treasurer, M. D. McDonald, Malignant Cove; Directors, John D. Chisholm, Angus J. McNeil, Angus McGillvray, A. R. McAdam, Hector McNeil, Malignant Cove; Auditors, J. D. Chisholm, John McNeil...........

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
26	45 50	41 50	246 32	233 07	13 25
21	55 50	44 23	162 15	45 40	116 75
27	176.50	77 29	525 94	370 30	155 64
83	207 00	85 62	419 33	322 90	96 43
22	51 00	43 00	200 34	147 34	53 00
24	72 00	48 74	129 42	97 81	31 61
17	47 50	42 05	113 59	91 09	22 50

Maryvale.—President, R. H. McGillvray, Lennox; Vice-President, R. A. McGillvray, Lennox; Secy-Treasurer, R. A. McDonald, Lennox; Directors, D. R. McGillvray, John A. McDonald, Maryvale; A. A. McDonald, Allan McDonald, Angus H. McDonald, Maryvale..........

Morar.—President, Angus Brown, Morar; Vice-President, John J. McPherson, Livingston Cove; Secy-Treasurer, Alex. J. Gillis, Morar; Directors, Allan Adams, John McMillan, Jas. McDougall, Wm. McEachern, Livingstons Cove, Daniel McPherson, Morar; Auditors, John Hanrahan, Daniel McDougall..............................

McAras Brook.—President, John A. McPherson, McAras Brook; Vice-President, John D. McPherson, McAras Brook; Secy-Treasurer, J. W. McAdam, McAras Brook; Directors, John R. McAdam, John D. Smith, John H. McEachern, Dan D. McDonald, McAras Brook, John D. McDonald, McAras Brook, John D. McLeod, Knoydart; Auditors, Colin McDonald, Angus McDonald......

North Grant.—President, John Grant, Clydesdale; Vice-President, Frank Chisholm, Antigonish; Geo. J. Sutton Antigonish; Directors, Joseph Grant, L. McLellan, John C. Chisholm, North Grant, Herbert Smith, Alex. A. McDonald, Briley Brook; Auditors, C. J. Chisholm, Joseph Grant....

Ohio.—President, Alex. G. Chisholm, Ohio; Vice-President, John J. McGillvray, Ohio; Secy-Treasurer, Hamish Sutherland, Ohio; Directors, Peter McLean, Dan McIsaac, Ronald McDonald, Ohio; Auditors, Angus McInnis, Ronald McDonald ....

Pleasant Valley.—President, John Duggan, Pleasant Valley; Vice-President, Allan McDonald, Pleasant Valley; Secy-Treasurer, R. McDonald, Pleasant Valley; Directors, Alex. McGillvray, August McGillvray, Ronald Smith, Dan Connor, Rod McIssac, Pleasant Valley; Auditors, Colin McGillvray, Allan McDonald ....

Pomquet.—President, Edmond Deon; Pomquet; Vice-President, Alex. R. Landry, Pomquet; Secy-Treasurer, E. A. Dorion, Pomquet; Directors, Isaac Deon, Nichols Deon, Louis Landry, J. E. Boudreau, Jas. Benoit, Pomquet; Auditors, Thos. Deon, Daniel Deon....................

Number of Members-	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
18	44 25	41 16	89 43	94 13	4 70
21	50 00	42 73	160 75	160 75	
18	45 30	41 45	198 82	180 75	18 07
48	100 00	56 39	260 50	243 24	17 26
16	88 00	53 11	130 72	158 10	27 38
23	53 00	43 55	90 55	83 61	6 94
50	142 01	67 87	237 56	195 00	42 56

St. Andrews.—President, Jas. R. Chisholm, Maryvale; Vice-President, John C. Chisholm, St. Andrews; Secy-Treasurer, Rev. Arch J. Chisholm, St. Andrews; Directors, Dr. Dan A. McIsaac, Dunmore, John D. McDonald, Maryvale, Robert Chisholm, Dan Boyd, St. Andrews, Angus McDonald, Glenelg; Auditors, Dr. Dan A. McIsaac, Dan Boyd......................................

South River and Loch Katrine.—President, John A. McMillan, Upper South River; Vice-President, Howard Kennedy, Upper South River; Secy-Treasurer, John S. McMillan, Upper South River; Directors, Alex. A. McPherson, Angus A McDonald, John S. McMillan, John H. McDonald, Upper South River, John H. Kenney, Loch Katrine; Auditors, A. D. McPherson, A. D. McIntosh....

South Side Cape George.—President, Jas. McEachern, Ballentynes Cove; Vice-President, Duncan Gillis, Cape George; Secy-Treasurer, John M. McEachern, Cape George; Directors, Wm. McPhie, Alex, McInnis, Wm. McInnis, Dan J. McDonald, Cape George, Collin McDonald, Ballentynes Cove...................................

South Side Harbor.—President, Dougald McDonald, South Side Harbor; Vice-President, John A. McDonald, South Side Harbor; Secy-Treasurer, Allan A. McDonald, Lower South River; Directors, Allan McDonald, Hughie A. McDonald, John A. McLellan, Alex. Cameron, Lower South River, Dan S. Fraser, South Side Harbor; Auditors, Hughie A. McDonald, Dougald McDonald............

Tracadie.—President, Joseph Landry, Tracadie; Vice-President, John Torpey, Afton; Secy-Treasurer, W. H. Delorey, Tracadie; Directors, Wm. Riley, Bayfield, Peter Landry, Afton, Walter Delorey, Angus Pitipas, Tracadie, Wm. Wallace, Big Tracadie; Auditors, John McMcKeough, Walter N. Tramble............................

West River.—President, Dan J. McDonald, Purl Brook; Vice-President, Hugh Fraser, Purl Brook; Secy-Treasurer, Ronald C. McGillvray, Glen Road; Directors, Thos. Ethridge, Alex. Kirk, Alex. Kennedy, Angus D. McDonald, Purl Brook, Frank McNaughton, Salt Springs; Auditors, Thos. Ethridge, Alex. Kirk..........................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
22	47 00	41 91	107 15	77 40	29 75
25	93 00	54 48	157 12	147 00	10 12
23	55 00	44 10	84 02	84 45	43
15	40 00	40 00	89 73	20 50	69 23
52	59 00	45 19	483 09	475 63	7 46
27	84 00	52 02	143 47	641 20	497 73

CAPE BRETON COUNTY.

Edwardsville.—President, Thos. Rudderham, Edwardsville; Vice-President, S. R. Lewis, Edwardsville; Secretary-Treasurer, Jas. Keating, Edwardsville; Directors, Ernest Fraser, J. B. Lewis, Thos. Roberts, Edwardsville, Stanley Lewis, Wallace Lewis, Point Edward........

Grand Lake.—President, D. M. McMillan, Sydney; Vice-President, Wm. Kyte, Grand Lake; Secy-Treasurer, N. D. McLean, Box 667, Sydney; Directors, Jas. Buchanan, Sydney, Kenneth Morrison, John McPherson, Dan. McAulay, Geo. Cane, Grand Lake.....................

George's River.—President, E. J. Johnston; George's River; Vice-President, Peter Almon, George's River; Secy-Treasurer, A. B. McPhee, Leitche's Creek; Directors, Thos. Roach, Scotch Lake, Barney Ryan, Alex. W. Gillis, George's River, Wilson, Gillis, George's River Station; Auditors, John McMullin, Luke Day...................

Homeville and Mira Bay.—President, Ronald McKeegan, Catalone Gut; Vice-President, Henry Dillon, Mira Gut; Secy-Treasurer, Chas. Spencer, Mira Gut; Directors; Everett Spencer, Herbert Spencer, D. J. Martel, Chas. Dillon, Wesley Nichols, Mira Gut; Auditors, Henry Dillon, Donald McInnis...............................

Little Bras d'Or.—President, Thos. A. Lawley, North Sydney; Vice-President, Parker Rice, George's River; Secy-Treasurer, W. W. Johnston, North Sydney; Directors, Chas. Johnston, Warren Moffatt, W. J. Moffatt, Lloyd McK. Johnston, Levi J. Hull, North Sydney; Auditors, Chas. Howatson, E. J. Johnston.....................

North Sydney.—President, J. B. Musgrave, North Sydney; Vice-President, C. A. Munn, Leitche's Creek; Secretary, Neal Beaton, Leitche's Creek Station; Treasurer, John McQueen, Leitche's Creek; Directors, J. R. Redmond, J. H. McLean, M. J. Ingraham, North Sydney, A. K. Jackson, R. M. Jackson, Jacksonville; Auditors, J. W. Allen, M. J. Ingraham...............................

Salem Road.—President, N. J. McDonald, Enon; Vice-President, John A. McDonald, Lake Uist; Secy-Treasurer, A. J. McCuish, Lake Uist; Directors, John W. McDonald, Salem Road, D. A. McDonald, Terra Nova, Angus D. McCuish, Big Glen, Alex. McDonald, Enon, D. A. McKinnon, Big Glen; Auditors, R. W. Munro, Angus McDonald..

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
28	72 00	48 74	229 72	160 00	69 72
16	60 00	45 46	New	Society	
39	55 95	44 35	235 18	216 50	18 68
15	50 00	42 73	142 35	135 59	6 76
36	42 25	40 61	327 60	220 74	106 86
46	226 00	90 82	346 95	284 09	62 86
72	260 00	100 11	375 01	375 20	19

South Bar.—President, A. R. Richardson, South Bar; Vice-President, A. J. McLeod, South Bar; Secy-Treasurer, F. A. McInnis, Whitney Pier; Directors, Michael Murphy, Edward Murphy, A. R. McLennan, Howard Richardson, Geo. Munn, Jr., South Bar; Auditors, Wm. Murphy, Percy Richardson...

Sydney Forks.—President, Rod. McRae, Sydney Forks; Vice-President, Robert McDonald, Sydney Forks; Directors, Angus L. McDonald, A. D. McDonald, Sydney Forks, Jas. McDonald, Dan A. Gillis, Portage, Michael P. Gillis, Meadow's Road; Auditors, Angus McDonald, A. D. McDonald...

COLCHESTER COUNTY.

Agricola.—President, Abraham Bentley, Otter Brook; Vice-President, H. M. Smith, Otter Brook; Secretary, H. C. Dunlap, C. C. Cox, Ed. Hamilton, Clifford Sill, H. D. Campbell, Otter Brook; Auditors, J. D. Dunlap, C. C. Cox.

Annan.—President, Angus Murray, Tatamagouche Mountain; Vice-President, Albert Cock, East New Annan; Secy-Treasurer, H. B. Cock, South Tatamagouche; Directors, Arthur Tucker, Jordan Thompson, Tatamagouche Mountain, John Baillie, South Tatamagouche, Malcolm Thompson, Central New Annan, Albert Cock, East New Annan; Auditors, Albert Cock, Arthur Tucker..........

Balmoral Mills.—President, R. D. McKay, Balmoral Mills; Vice-President, A. S. McKay, Balmoral Mills; Secy-Treasurer, John Munroe, Balmoral Mills; Directors, John A. Ferguson, Peter A. McDonald, R. D. McKay, John J. Murray, Balmoral Mills, Alex. Ross, East Earltown; Auditors, Geo. S. Baillie, Hugh W. McKay.............

Bass River.—President, John H. Fulton, Bass River; Vice-President, S. H. Fulton, Bass River; Secy-Treasurer, Jas. Fulton, Bass River; Directors, D. H. Lank, Wm. Starratt, Upper Bass River; S. H. Fulton, Capt. E. Thompson, Burton Densmore, Bass River; Auditors, Amos Fulton, Capt. A. Densmore...................................

Bayhead.—President, Geo. Dunphy, R. R. 1, Bayhead; Vice-President, S. Clark, R. R. I., Bayhead; Secretary, J. L. Cunningham, R. R. I., Bayhead; Treasurer, A. S. McDonald, R. R. I., Bayhead; Directors, Wm. Millard, S. Clark, S. Mattattall, A. S. McDonald, W. C. Johnson, R. R. I., Bayhead; Auditors, A. Upham, W. Millard......

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
18	92 00	54 21	295 78	313 95	18 17
24	48 00	42 18	166 50	60 00	106 50
76	196 00	82 62	387 34	505 10	117 76
26	45 50	41 50	84 29	119 26	34 97
29	43 00	40 81	203 82	147 10	56 72
40	101 50	56 80	168 85	131 25	37 60
23	40 50	40 14	200 95	178 00	22 95

Brookfield.—President, J. T. Bell, Brookfield; Vice-President, Percy Bently; Secy-Treasurer, Elwood McLellan Brookfield; Directors, T. D. Bates, R. B. McLellan, Albert Boomer, Reginald Dickey, Aaron Hamilton, Brookfield; Auditors, J. J. Hamilton, W. L. Brenton...............

Brule Shore.—President, A. C. Cook, R. R. I., Tatamagouche; Vice-President, Noah Jollimore, R. R. I., Tatamagouche; Secy-Treasurer, Jas. S. Reid, R. R. I., Tatamagouche; Directors, Noah Jollimore, Alex. McKinnon, Geo. Dunn, A. P. Semple, Geo. Fraser, Tatamagouche, R. R. I.,; Auditors, Geo. Dunn, Noah Jollimore..........

Diary.—President, John A. Wilson, Central New Annan; Vice-President, Geo. R. Miller, Central New Annan; Secy-Treasurer, C. J. Cock, Central New Annan; Directors, Geo. R. Miller, John C. Bell, West New Annan, Ira Nelson. Tatamagouche, Alex. M. Swan, Central New Annan, H. H. McNutt, Tatamagouche Mountain.....................

Earltown.—President, Wm. D. McKay, Earltown; Vice-President, R. E. McKay, Earltown; Secy-Treasurer, Wm. J. McDonald, Earltown; Directors, Thos. McKay, Jas. A. McKay, R. E. McKay, Geo, McKenzie, Eartlown; Auditors, Wm. McKenzie, Geo. McIntosh..............

Farmers.—President, Murdock Curry, Londonderry Station; Secy-Treasurer, Chas. Gray., East Mines Station; Directors, E. A. McLean, Edward McLean, Geo. Dill, Londonderry, W. E. McLean, E. C. Fletcher, Glenholme; Auditors, Robert McKay, W. E. McLean..............

Londonderry.—President, J. Gordon Wylie; Glenholme; Vice-President, Ernest McCully, Morristown; Secretary, T. W. Morrison, Glenholme; Treasurer, Geo. Flemming, Glenholme; Directors, M. M. Reid, Glenholme, Gesner Lynds, Capt. A. McNutt, Chas. Vance, Stephen Jennings, Masstown; Auditors, Arthur Putnam, Fowler Fletcher....

Middleton.—President, David McLeod, Denmark; Vice-President, John W. Langille, Denmark; Secy-Treasurer, Oliver Stevenson, Denmark, R. R. 2.; Directors, R. C. Wilson, J. R. Hogan, Levingston Cameron, Selden Swan, John R. Langille, Denmark; Auditors, Selden Swan, John R. Langille....................................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts	Total Expenditure	Balance
35	77 50	50 24	221 23	125 45	95 78
37	63 50	46 42	252 47	187 34	65 13
23	40 25	40 07	93 35	94 75	1 40
22	55 00	44 10	86 46	69 70	16 76
107	259 25	99 90	372 03	352 87	19 16
43	143 00	68 14	352 22	277 45	74 77
41	66 25	47 17	194 10	193 52	58

Millburn.—President, John Bonyman, R. R. 2, Tatamagouche; Vice-President, Arthur Byers, R. R. 2, Tatamagouche; Secy-Treasurer, Henry S. Swan, R. R. 2 , Tatamagouche; Directors, Thos. Chalmers, Arthur Byers, Aubrey Atchison, A. W. Swan, R. R. S., Tatamagouche . . . .

North Earltown.—President, Wellington Ross, North Earltown; Vice-President, Wm. M. Stewart, North Earltown; Secy-Treasurer, Alex. W. McKay; Directors, Dan G. Ross, C. R. McKenzie, W. R. Murray, Crawford Hayward, John M. Munroe, North Earltown; Auditors, D. R. McKenzie, John M. Munroe . . . .

North River.—President, R. H. Nelson, North River; Vice-President, A. W. Higgins, North River; Secy-Treasurer, Wm. Murray, North River; Directors, Calvin McNutt, Stanley Murray, Wm. Blair, Geo. Payne, C. C. Douglas, North River; Auditors, A. W. Higgins, David Upham . . . . . .

Portaupique.—President, J. N. Brown, Highland Village Vice-President, W. P. Hennessey, Highland Village; Secy-Treasurer, H. A. Baird, Portaupique; Directors, Edgar McMillan, Highland Village; Lorine Cook, Samuel Carr, Wm. Creelman, Burton Roberts, Portaupique . . . .

Princeport.—President, A. H. Faulkner, Princeport; Vice-President, H. V. Phillips, Princeport; Secy-Treasurer, Aubrey Bradley, Princeport; Directors, Chas. N. Creelman, Chas. Good, Isaac Creelman, Clarence Foster, Hedley Bradley, Princeport; Auditors, Scott Curtis, Blois Bradley.

Springside.—President, Wyman Johnston, Newton Mills Vice-President, G. B. Hamilton, Springside; Secy-Treasurer, F. T. Gammell, Newton Mills; Directors, Lyman Hamilton, Cross Roads, Lyman Fulton, Newton Mills, Jas. Creelman, Springside, D. F. Creelman, Jas. Archibald, Cross Roads; Auditors, Willis Rutherford, Warren Johnston . . . .

Sterling.—President, W. M. Campbell, West New Annan; Vice-President, Wm. Gray, West New Annan; Secy-Treasurer, Isaac Gray, Annandale; Directors, Chas. Bell, J. D. Murdock, Geo. Marshall, Jas. McDonald, West New Annan, John Grace, Annandale; Auditors, Jas. McDonald, George Gray.

Stewiacke.—President, Foster Campbell, Stewiacke; Vice-President, Angus Rose, Stewiacke; Secy-Treasurer, A. D. Fulton, Stewiacke; Directors, Fred Fulron, E. G. Campbell, A. S. Dennis, O. F. Wright, S. T. Gould, Stewiacke . . . .

Number of Members	Amount Subscribed	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
20	40 00	40 00	171 67	148 06	23 61
19	56 50	44 51	98 75	104 59	5 84
15	59 00	45 19	210 19	83 00	127 19
42	52 00	43 27	189 81	129 91	59 90
22	146 50	69 09	New	Society	
52	114 00	60 21	271 49	161 80	109 69
44	52 50	43 41	100 34	90 50	9 84
49	139 00	67 04	589 51	396 21	193 30

Tatamagouche.—President, W. B: McLellan, Tatamagouche; Vice-President, G. B. Clarke, Tatamagouche; Secy-Treasurer, J. J. Clark, Tatamagouche; Directors, B. S. Langille, Thos. Bonyman, Arthur Cunningham, Chas. Henderson, Tatamagouche; Chester McConnell, Waldergrove; Auditors, Jas. Bryden, Gordon Clarke............

Waugh's River.—President, Jas. W. McKay, Waugh's River; Vice-President, John R. McKay, Waugh's River, Secy-Treasurer, J. M. McKay, Waugh's River; Directors, Geo. W. McKay, J. R. McKay, Kenneth R. McKay, Waugh's River, Kenneth Sutherland, River John Road....

CUMBERLAND COUNTY.

Amherst,—President, Norman Black; Vice-President, C. E. Shipley, R. R. 4, Amherst; Secy-Treas., C. H. Black, 208 Victoria St., Amherst; Directors, W. W. Embree, Amherst; E, V. Thompson, Fort Lawrence, Ernest W. Embree, East Amherst, B. C. Gourley, Amherst, Joseph Baird, R. R. 3., Amherst; Auditors, Samuel Freeman, W. N. Boomer...

Beckwith.—President, Chas. Fraser, Rosendale; Vice-President, Vance Mattinson, Beckwith, C. H. Angus, Carrington; Directors, Chas. Ripley, Mount Pleasant, Albert Fahey, Rosendale; R. S. Flinn, Morton Eaton, R. D. Walker, Beckwith; Auditors, Jerry Mattinson, Phillip Mattinson...

East Wallace Union.—President, D. G. McKenzie, Malagash, R. R. I.,; Vice-President, W. C. Smith, Malagash R. R. 2; Secy-Treasurer, Stephen Seaman, Malagash, R. R. 2; Directors, W. C. Smith, Chas. Carlyle, John C. McKenzie, J. H. Miller, G. A. Miller, Malagash, R. R. 2; Auditors, G. A. Miller, J. H. Canfield....................

Fox Harbor.—President, D. M. Bacon, Fox Harbor Point; Vice-President, Lewis Green, Fox Harbor Point; Secy-Treasurer, Laurie McFarlane, Fox Harbor, Dan Rhude, North Wallace, J. A. McFarlane, D. R. Stronberg, Murray Robertson, Fox Harbor Point..................

Gulf Shore.—President, Daniel Reid, Gulf Shore; Vice-President, Laurie McLeod, Gulf Shore; Secy-Treasurer, R. W. Robb, Gulf Shore; Directors, James Ross, Irish Whitman, Angus McLeod, Wm. Langille, S. McIver, Gulf Shore; Auditors, Murdock McIver, Gordon McDonald....

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
49	78 25	50 45	158 64	172 14	13 50
32	50 00	42 73	164 74	194 34	29 60
104	105 00	57 76	900 00	899 17	183 00
17	42 50	40 68	147 55	72 18	75 37
20	40 00	40 00	102 89	65 84	37 05
29	40 00	40 00	82 50	87 10	4 60
21	63 00	46 28	New	Society	

Lorneville.—President, Wm. Jackson, Lorneville; Manford Oxley, Tidnish; Secry-Treasurer, James J. Brown, Lorneville, R. R. 2; Directors, Thos. Ogden, Earl Jackson, Tidnish, Walter Embree, Allison Baxter, Lorneville, Chas. Ogden, Amherst Beach........................

Linden.—President, Chandler Smith, Shinimics Bridge; Vice-President, Thos. S. Furlong, Shinimicas Bridge; Ernest Smith, Shinimicas Bridge; Directors, Calvin Angus, Pugwash, R. R. I., Ross Wood, Clark T. Hunter, Wm. Dickinson, Shinimicas Bridge, Joseph H. Mills, Pugwash, R. R. I.; Auditors, Wylie Darragh, Lambert Smith..............

Malagash.—President, Joseph T. Tree, Malagash, R. R. I; Vice-President, Wm. McKenzie, Malagash, R. R. I.; Secretary-Treasurer, Arthur Tree, Malagash, R. R. I.; Directors, Geo. Myers. Lawrence Treen, J. T. McKenzie, Jas. B. Lombard, Stillman Purdy, Malagash R. R. I.; Auditors, Jas. Beattie, Chas. Clarke.....................

Middleboro.—President, A. W. Nelson, Hartford; Vice-President, Wm. Howard, Middleboro; Secy-Treasurer, G. G. McKim, Hartford; Directors, C. A. Fountain, Upper Middleboro, A. W. Nelson, G. G. McKim, Steve Robinson, Hartford, Upper Middleboro, A. W. Nelson, Robinson. Hartford, Asa Stevens, Middleboro; Auditors, Edward Havard, Ira Crawford..........................

Minto.—President, David Bacon, Nappan Station; Vice-President, J. McCully Pipes, Nappan Station; Secy-Treasurer, J. Wellington Lowther, Nappan Station; Directors, F L Roach, Morley Ripley, Herbert Blenkhorn, Nappan Station, J E Harrison, Maccan; Jas, I Stuart, Amherst Point, Auditors, F L Roach, David Bacon ......

Parrsboro.—President, F. H. Jeffers, Lakelands; Vice-President, D. W. Holmes, Cross Roads; Secretary-Treasurer, Robie Kirkpatrick, Kirk Hill; Directors, H. R. Berry, New Prospect; Harvey Smith, Lakelands, James Brown, William Murray, Daniel O'Regan, Lakelands; Auditors, Henry Fader, J. W. Gibson..................

Pugwash.—President, D. Fullerton, Pugwash; Vice-President, Daniel Reid, Pugwash; Secy-Treasurer, D. J. Mitchell, Pugwash; Directors, J. W. Henderson, Elmer Clark, Gordon Fullerton, Beecher Robertson, Angus McLean, Pugwash; R. D. Mitchell, Gordon Fullerton........

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
60	126 00	63 49	534 96	267 95	267 01
30	127 00	63 77	New	Society	
25	92 00	54 20	142 30	157 42	15 12
67	84 50	52 16	217 56	159 00	58 56
27	94 00	54 75	196 56	199 50	2 94
19	43 50	40 96	270 33	327 97	57 64
30	49 50	42 60	106 46	98 75	7 71

River Philip.—President, Edward Giles., River Philip; Vice-President, Fred Filmore, River Philip; Secy-Treasurer, R. R. Black, Oxford Jct.; Directors, Geo. Angevine, Geo. L. King, Linton Purdy, Fred Bent, Albert McLellan, River Philip..

Shinimicas Bridge.—President, E. E. Fisher, Amherst, R. R. 4; Vice-President, G. O. Smith, Shinimicas Bridge; Secy-Treasurer, J. C. Brander, Shinimicas Bridge; Directors, L. S. Fisher, Amherst, R. R. 4, A. R. Blair, Shinimicas R. R. I., J. A. Moore, G. O. Smith, Shinimicas Bridge, R. T. Fisher, Amherst, R. R. 4; Auditors, G. H. Smith, J. P. Smith..

Six Mile Road.—President, S. R. Coulter, Wallace, R. R. I; Vice-President, Arthur Angevine, Wallace, R. R. I; Secy.-Treasurer, L. W. Crawford, Wallace, R. R. I.; Directors, John Fraser, M. Benjamin, L. Huestis, H. Hurl, H. Stevens, Wallace, R. R. I; Auditors, S. R. Coulter, L. Huestis..

Upper Wentworth.—President, Samuel Little, Wentworth Station; Vice-President, J. N. McNutt, Wentworth Station; Secy-Treasurer, R. C. Swallow, Wentworth Centre; Finlay Kennedy, East Wentworth, F. A. Smythe, Wentworth Station, E. T. Higgins, Walter Embree, G. H. Swallow, Wentworth Station; Auditors, W. A. Weatherbee, Rev. C. H. Johnson..............................

Victoria.—President, David Murphy, Victoria; Vice-President, Wm. VanBuskirk, Streets Ridge; Secy-Treasurer, John W. Crowly, Streets Ridge; Directors, Duncan Ross, Edgerton Betts, Clarence Thompson, Victoria, Dan Crowly, Streets Ridge, Stanley Stewart, South Victoria; Auditors, Jas. Roblee, M. Mahoney..........................

Wallace Bay.—President, E. E. Peers, Pugwash, R. R. 3; Vice-President, H. D. Gould, Pugwash, R. R. 3; Secy-Treasurer, L. A. McKim, Pugwash, R. R. 3; Directors, Geo. W. Scott, W. A. Tuttle, Stephen Tuttle, D. M. Brown, L. A. McKim, Pugwash R. R. 3; Auditors, R. A. O'Brien, Dan McKim ....

Wallace Grant.—President, W. J. Stevens, Bayhead, R. R. 2; Vice-President, Garfield Colter, Bayhead R. R. 2; Secy-Treasurer, W. A. Reeves, Bayhead, R. R. 2; Directors, W. A. McFarlane, J. W. McNutt, L. G. Stevens, Wm. McEachern, Percy Hope; Bayhead R. R. 2; Auditors, Waldo Coulter, A. G. McIntosh.......................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
44	44 00	41 10	New	Society	
36	83 00	51 75	276 59	205 50	71 09
35	41 00	40 27	159 50	155 21	4 29
20	41 00	40 27	90 73	92 72	1 99
31	43 00	40 81	165 53	165 00	53
17	59 50	45 33	107 93	107 80	13
25	41 00	40 27	191 90	173 00	18 90

DIGBY COUNTY.

Belliveau Cove.—President, Lemoine Belliveau, Belliveau Cove; Vice-President, Chas. Belliveau, Belliveau Cove; Secy-Treasurer, Antime Doucet, Belliveau Cove; Directors; Alca Belliveau, Damien Doucet, Emilier LeBlanc Jas. C. Theriault, Augustine Theriault, Belliveau Cove

Digby Central.—President, J. O. Turnbull, Digby; Vice-President, James Trevoy, Brighton; Secy-Treasurer, F. W. Nichols, Digby; Directors, Jas. Trevoy, Brighton, J. A. Rice, C. B. McNeil, Jonathan Letteny, Digby, Jacob Trask, Marshalltown; Auditors, Jonathan Letteny, A. L. M. Sevally...

Gilbert's Cove.—Albert Melanson, Ashmore; Vice-President, Chas. White, Ashmore; Secy-Treasurer, Joseph Kinney, Gilbert's Cove; Directors, Chas. P. Comeau, Frederick Sabean, Andrew Morrisey, Henry Melanson, Chas. W. Kinney, Gilbert's Cove; Auditors, Frederick Sabean, Albert Melanson..............................

Hillsburg.—President, W. E. Reid, Bear River; Vice-President, C. D. Rice, Bear River; Secretary, C. F. McDormand, Bear River; Treasurer, H. R. Kinney, Bear River; Directors, H. E. Chisholm, Fred. A. Read, Edgar Miller, H. E. Harris, John Milner, Bear River; Auditors, C. D. Rice, C. F. McDormand..............................

Little Brook.—President, Zozine Comeau, Little Brook; Vice-President, S. LeBlanc, Little Brook; Secy-Treasurer, Arnaud S. Comeau, Little Brook; Directors, Rupert Cothian, Albane LeBlanc, Little Brook, Isaac H. LeBlanc, Church Point, Augustine Comeau, Eddie J. Gaudet, Comeauville; Auditors, Camille Comeau, Elithare Dugas......

Rossway.—President, Byron Robbins, Rossway; Vice-President, Caswell Denton, Rossway; Secy-Treasurer, C. W. Cornwell, Rossway; Directors, David Peters, Wm. Hutchins Israel Banks, W. H. Cossaboom, Oswall Mullin, Rossway; Auditors, H. B. Nichols, Leslie McKay.................

St. Mary's.—President, Benjamin Robbins, Centerville; Vice-President, Henry Cossaboom, Centreville; Secy-Treasurer, Edward McKay, Sandy Cove; Directors, L. Morehouse, George Holmes, Amasa Eldridge, Chas. Burns, Centreville; Auditors, Thos. Craig, Geo. Eldridge........

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
34	58 00	44 91	333 68	238 71	94 97
194	287 80	107 69	642 13	605 45	36 68
54	62 80	46 24	207 46	215 81	8 35
57	147 00	69 23	463 91	440 62	23 29
60	86 00	52 57	157 50	122 80	34 70
38	70 50	48 33	415 26	373 43	41 83
85	118 00	61 31	363 52	161 00	202 52

Weymouth.—President D. Kempt, Weymouth; Secy-Treasurer, C. H. Butler, Weymouth; Directors, J. F. Blaydon, R. J. Taylor, H. L. Jones, Harley Johns, Archibald Ruggles, Weymouth; Auditors, N. A. Ruggles, D. C. Davidson.......................................

GUYSBORO COUNTY.

Aspen.—President, T. A. McKeen, Aspen; Vice-President, C. W. Grant, Melrose; Secy-Treasurer, Vincent McKean, Aspen; Directors, Osburn Cumminger, Geo. W. Mitchell, Aspen, Jas. A. Tait, Daniel Tait, H. E. Stewart Melrose; Auditors, E. A. McKean, C. W. Grant..........

Erinville.—President, Patrick Walsh, East Erinville; Wm. McDonald, West Erinville; Secy-Treasurer, Joseph Lawlor, West Erinville; Directors, Richard White, Michael Flynn, Wm. O'Neil, John Chisholm, John Morrison, Erinville; Auditors, Wm. McKinnon, Michael Flynn........

Fishers Mills.—President, Geo. L. Cameron, Melrose; Vice-President, Ernest McKeen, Melrose; Secy-Treasurer, Wm. H. Mitchell, Aspen; Directors, Isaac McKeen, Dougald A. Cameron, Arthur Fisher, Aspen, Thos. C. McKeen, Melrose, Isaac Fisher, Fishers Mills; Auditors, Isaac Fisher, Isaac McKeen........................

Glenelg.—President, A. G. Lawson, Melrose; Vice-President, David Whidden, Glenelg; Secy-Treasurer, A. H. McKeen, Glenelg; Directors, R. B. Mills, A. D. Archibald, J. J. Kirk, Glenelg, Daniel Tait, Melrose, J. D. Kirk, Aspen; Auditors, J. D. Kirk, A. D. Archibald.................

Goshen.—President, Andrew Sinclair, Goshen; Vice-President, Jas. A. Sinclair, Goshen; Secy-Treasurer, Alex. Sinclair, Goshen; Directors, W. H. Sinclair, Leonard Sinclair J. F. Forbes, Alfred Forbes, Wm. McIntosh, Goshen; Auditors, A. F. McNaughton, John A. Sinclair.........

Guysboro.—President, J. A. Fulton, Guysboro; Vice-President, C. E. Cook, Guysboro; Secy-Treasurer, H. M. Scott, Guysboro; Directors, En. Johnson, Stephen Grant, Rochavale, John E. Dillon, J. C. Jones, Guysboro........

Intervale.—President, Wm. G. Aikens, Guysboro Intervale; Vice-President, James Whall, Guysboro Intervale; Secy-Treasurer, Bruce Ferguson, North Intervale; Directors, Wm. McKenzie, Herbert S. Ferguson, North Intervale, Hugh Ferguson, Samuel Hughes, Wm. Chisholm, Guysboro Intervale; Auditors, Earle Aikens, Wm. C. Chisholm....

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
41	41 00	40 27	New	Society	
17	41 00	40 27	123 00	80 00	43 00
26	41 00	40 27	158 51	158 00	51
19	42 20	40 60	98 60	116 70	18 10
20	40 00	40 00	158 11	58 35	99 76
27	40 00	40 00	139 96	131 40	8 56
63	101 00	56 67			
44	52 50	43 41	97 26	80 79	16 47

Manchester.—President, Stanley Lipsett, Manchester; Vice-President, J. R. O'Brien, Manchester; Secy-Treasurer, D. F. Connolly, Manchester; Directors, Albert Hull, John H. Myers, Thos. H. Scranton, Milton Simpson, Manchester, John Reddy, Boyleston; Auditors, D. F. Connolly, J. R. O'Brien..

New Harbor.—President, Baxter Sangster, New Harbor; Vice-President, Townshend Sangster, New Harbor; Secy-Treasurer, Jas. S. Sponagle, New Harbor; Directors, Geo. M. Gillis, Herbert Gillis, Fred P. Sangster, John M. Sangster, Ernest Gillis..............................

New Town.—President, Robt. Archibald, New Town; Vice-President, Tom Fisher, New Town; Secy-Treasurer, W. H. Archibald, New Town; Directors, Henry McInnis, Baxter Cameron, Wesley McKay, Vincent McLean, J. T. Bain, New Town; Auditors, Tom Bain, Wm. Williams....

Port Hilford and Wine Harbor.—President, John R. Hurst, Port Hilford; Vice-President, John R. Kinley, Port Hilford; Secy-Treasurer, Fred. L. Hewett, Port Hilford; Directors, Moses Mugford, Austin Pickett, Port Hilford, Fred C. Bennett, Indian Harbor Lake, G. A. Hirschfield, Wine Harbor, David C. Flemming, Wine Harbor; Auditors, Geo. H. Hurst, Jas. Finde..........................

Stillwater.—President, W. P. Fraser, Stillwater; Vice-President, Murdock Whitman, Sherbrooke; Secretary, D. J. Archibald, Stillwater; Treasurer, A. McDonald, Stillwater; Directors, Duncan Fraser, J. F. Davidson, W. H. Widden R. J. Weir, W. A. McDonald, Stillwater; Auditors, R. J. Weir, W. A. McDonald..........................

HALIFAX COUNTY.

Dartmouth.—President, Maynard Tulloch, Dartmouth; Vice-President, W. W. Peverill, Dartmouth; Secy-Treasurer, E. C. Morash, Dartmouth; Directors, Judson Baker, Newton Kuhn, J. R. Morash, Norman Morash, William Baker, Alex. Marks, Dartmouth; Auditors, W. L. Eisener, Alex. Marks...................................

Eastern Star.—President, Jas. A. Thomas, Preston; Vice-President, Joseph Gentles, Preston; Secretary, W. B. Thomas, Preston; Treasurer, T. Williams, Preston; Directors, S. Ross, Benj. Evans, Simon Gates, John Brooks, Geo. Williams, Preston; Auditors, Allen Evans, Ben. Manette......................................

Number of Members-	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
101	123 00	62 68	293 92	259 17	34 75
41	70 75	48 40	197 02	177 73	19 29
26	57 00	44 64	175 36	160 20	15 16
67	68 50	47 79	160 45	143 56	16 89
34	45 50	41 50	145 32	74 50	70 82
36	76 50	49 97	178 67	40 30	138 37
25	50 00	42 73	131 63	118 00	13 63

Elderbank.—President, Chas. Ogilvie, Elderbank; Vice-President, W. A. Dares, Elderbank; Vice-Treasurer, H. E. Cole, Elderbank; Directors, Ralph Cruikshank, Henry Grant, Maurice Cole, John Ogilvie, Morton McMillan, Elderbank; Auditors, Chas. Ogilvie, Henry Grant........

Halifax.—President, R. H. Edwards, Halifax; Vice-President, John MacAloney, Fairview.; Secretary, H. H. Blois, 365 Quinpool Road; Treasurer, R. O'Neil Duggan, Robie St; Directors, G. Creighton, G. R. Marshall, R. Duggan, F. W. Bowes, Halifax; Auditors, F. Edwards, R. H. Skinner..

Musquodoboit Harbor.—President, W. S. Ritcey, Musquodoboit Harbor; Vice-President, Geo. Landell, Musquodoboit Harbor; S. Sutherland, Musquodoboit Harbor; Directors, Jas A. Ritcey, John H. Rollings, Alex. Slade, R. J. Stoddard, Oswald Mosher, Musquodoboit Harbor....

Middle Musquodoboit.—President, Sidney McKeen, Mid. Musquodoboit; Vice-President, Harry Guild, Middle Musquodoboit; Secy-Treasurer, L. L. Archibald, Mid. Musquodoboit; Directors, Roy Archibald, Arnold Gladwin, Samuel Crockett, Milton White, Chas. Logan, Mid. Musquodoboit; Auditors, John B. Archibald, Jas. Sedgewick

Seaside.—President, Norman Hiltz; Secy-Treasurer, W. D. Conrad, West Lawrencetown; Directors, Freeman Sellars, Isaac Sellars, Norman Hiltz, Sidney Sellars, Aubrey Conrad...

HANTS COUNTY.

Avon.—President, David Withrow, Newport Landing; Vice-President, Terry Parker, Newport Landing; Secy-Treasurer, E. B. Mosher, R. R. 2, Newport; Directors, W. B. Wallace, Wm. Withrow, E. B. Mosher, James Benedict, Geo. Allison, Newport Landing; Auditors, John Shaw, Freeman Connors...................................

Burlington.—President, R. P. Harvie, Burlington; Vice-President, Alonzo Harvie, Burlington; Secy-Treasurer, Robie C. Sanford, Burlington; Directors, Clarence Harvie, Welsford Salter, James Sanford, Coles Greene, Frank Allen, Burlington; Auditors, Clarence Harvie, Harvie Lynch...

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
20	87 50	52 98	206 65	153 50	53 15
22	40 00	40 00	530 47	144 65	385 82
56	93 00	90 67	285 95	237 24	48 71
82	225 50	54 48	265 62	505 89	240 27
16	40 50	40 14	84 58	80 00	4. 58
32	141 00	67 59	371 33	303 00	68 33
30	60 00	45 46	281 36	92 52	187 84

Fenwick.—President, Seymour Main, East Noel; Vice-President, Benjamin Faulkner, Noel; Secretary, Isaac H. Densmore, Burncoat; Treasurer, Sidney O'Brien; Noel; Directors, John Brown, Martin Faulkner, Burncoat, Silvan O'Brien, Noel, Morris Densmore, East Noel, Wilbert McCulloch, Noel Shore..............................

Gore.—President, W. B. McDougall, West Gore; Vice-President, E. Williams, Riverside Corner; Secy-Treasurer, H. B. McDougall, West Gore; Directors, Ansel Scott, Seymour Wallace, Blois Baron, Gore; W. L. Wallace, West Gore, Gordon Ward, Riverside Corner; Auditors, F. B. McPhee, Fred Sommers..............................

Hantsport.—President, S. P. Schurman, Mount Denson; Vice-President, N. E. Caldwell, Hantsport; Secy-Treasurer, H. P. Lynch; Mount Denson; Directors, Thos. Terfry, Wilbert Corman, Gilbert Fader, Hantsport; Clyde Davis, W. A. Curry, Mount Denson........................

Maitland.—President, Thos. G. Smith, Maitland; Vice-President, Herbert Eaton, Maitland; Secy-Treasurer, W. F. Roy, Maitland; Directors, John Carr, Lawson Hayes, Herbert Eaton, Capt. Geo. Douglas, John McCumber, Maitland; Auditors, Wm. McKenzie, John McCumber....

Meander.—President, Harry Aston, Newport; Vice-President, Murdock Harvie, Newport; Secy-Treasurer, Morris J. Dill; Directors, Frank Lunn, Carl Smith, Murdock Harvie, Andrew Harvie, Stanley Forest, Newport; Auditors, Harry Aston, Carl Smith...................................

Midland.—President, Harry McCulloch, Kennetcook; Vice-President, Wm. Ettinger, Noel Road; Secy-Treasurer, James McG. Anthony, Kennetcook; Directors, Wm. Gorman, Joseph Barron, Chas. Ettinger, Kennetcook, Willard Ettinger, Alfred White, Noel Road; Auditors, Scott Ettinger Edgar Anthony...................................

Progress.—President, George Wright, Elmsdale; Vice-President, E. G. McMillan, Elmsdale; Secy-Treasurer, Hugh Fraser, Elmsdale; Directors, Geo. Fraser, Jacob Gilby, Joseph Flemming, Frank McDonald, Harvy Robertson, Elmsdale; Auditors, Gordon Casey, S. E. McMillan..

Number of Members	Amount Subscribed	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
38	74 50	49 42	143 80	199 12	55 32
20	78 50	50 52	287 28	262 80	24 48
48	100 00	56 39	175 71	148 40	24 31
22	43 00	40 81	230 76	90 26	140 50
15	40 00	40 00	148 21	95 50	52 71
31	122 00	62 40	New	Society	
41	82 50	51 61	223 92	184 18	39 74

Scotch Village.—President, B. Anthony, Mosherville; Vice-President, O. G. Walley, Scotch Village; Secy-Treasurer, L. M. Smith, Scotch Village; Directors, Percy Cochrane, Geo. O. Smith, James Ross, H. W. Dimmock, Scotch Village; Robie Harvie, Mosherville; Auditors, Percy Cochrane, H. W. Dimock..............................

Selmah.—President, A. M. Anthony, Lower Selmah; Vice-President, Robert Cox, Sterling Brook, Secy-Treasurer, Harold Fiske, Selmah; Directors, Cyrus Weldon, Clarence Putnam, Selmah, Harry Densmore, Sterling Brook, Freeman Finton, Sterling Brook; Edward Densmore, North Selmah....................................

Shubenacadie.—President, James McKenzie, Shubenacadie; Vice-President, Allison McDonald, Shubenacadie; Secretary, A. H. Snide, Shubenacadie; Treasurer, E. M. Davis, Shubenacadie; Directors, David Leck, T. E. Blackburn, Patrick Keohan, W. D. Bowers, Shubenacadie, Edwin Wardrope, Melford; Auditors, Robert Gass, J. A. Kirkpatrick ....

Urbania —President, Chas. A. Rose, Urbania; Vice-President, Geo. C. Rose, Urbania; Secy-Treasurer, William Rose, Urbania; Directors, Harding Cameron, South Maitland, Wm. Walker, Harry Dimock, Weston Barbick, Walter McKenna, Urbania; Auditors, Hugh Fraser, Walter Rose.......................................

Windsor.—President, Wm. O'Brien, Windsor Forks; Vice-President, Winburn Saunders, Martock; Secretary, Geo. W. DeWolf, Three Mile Plains; Treasurer, Geo. O'Brien, Windsor Forks; Directors, Harry McNeil, Windsor Forks; Geo. Halry, C. F. McHeffy, Martock, Frank Pugsley, Windsor; Auditors, Nat Dill, Fred Morton......

INVERNESS COUNTY.

Anslie.—President, Malcolm A. McMillan, East Lake Ainslie; Vice-President, David Mutch, East Lake Ainslie; M. C. McMillan, East Lake Ainslie; Treasurer, Malcolm N. McKinnon, East Lake Ainslie; Directors, Dan C. McDonald, Dan McLean, East Lake Ainslie; D. A. McKinnon, Archie McKinnon, Kirkwood, David McKinnon, Scotsville; Auditors, M. R. McMillan, Allan McLean....

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts	Total Expenditure	Balance
47	99 50	56 25	162 36	162 36	
38	102 00	56 94	458 85	400 92	57 93
100	241 50	95 05	968 94	591 67	377 27
19	41 00	40 27	New	Society	
61	271 00	103 11	678 39	651 00	27 39
20	40 00	40 00	87 43	124 78	37 35

Belle Cote.—President, John D. Doucet, Belle Cote; Vice-President, Geo. T. Munroe, Belle Cote; Secy-Treasurer John A. McMillan, Belle Cote; Directors, Arch D. McLellan Patrick LeBlanc, Marcellin Chiasson, Constant Au Coin, Thos. B. Shaw, Belle Cote; Auditors, Chas. Doucet, John F. LeBlanc....................................

Black River.—President, Malcolm F. Campbell; Beatonville; Vice-President, James Beaton, Beatonville; Secy-Treasurer, A. J. Campbell, Beatonville; Directors, A. D. Campbell, Beatonville, Allan Beaton, John A. Cameron, Archy Campbell, Glenora Falls, Horrace Smith, Glendyer; Auditors, Allan Beaton, Benjamin McKinnon............

Cheticamp.—President, Baptiste LeFort, Point Cross; Secy-Treasurer, Patrick Cormier, Point Cross; Directors, John Cormier, Emelien Lefort, Paul Devreaus, Chas. AuCoin, Delfin Lindee, Point Cross; Auditors, Phillippee LeBlanc, Chas. Lefort...........................

Dunvegan.—President, D. M. McLennan, Dunvegan; Vice-President, James N. McLeod, St. Rose; Secy-Treasurer, D. J. McLeod, Dunvegan; Directors, Archibald Beaton, Dan. B. McPherson, John C. McLeod, Dunvegan; Auditors, Rod, McRae, Ronald McIsaac...............

Emerald.—President, Alex. Miller, Emerald; Vice-President, Nicholas Coady, Emerald; Secy-Treasurer, Jas. P. Tompkins, Emerald; Directors, Hugh S. McLellan, Mount Pleasant, Maurice Denn, Jas. R. Murphy, Samuel McDonnall, John J. Murphy, Emerald; Auditors, Hugh S. McLellan, James R. Murphy.........................

East Margaree.—President, John R. LeBlanc, East Margaree; Vice-President, Jas. D. LeBlanc, East Margaree; Secy-Treasurer, Rev. R. McDonald, East Margaree; Directors, P. J. LeBlanc, Dan P. LeBlanc, John C. LeBlanc, Paul P. Doucet, East Margaree.....................

Glenville.—President, Allan D. McLellan, Glenville; Vice-President, Neil D. McInnis, Glenville; Secy-Treasurer, J. J. McLellan, Glenville; Directors, John D. Gillis, Rod McLean, Glenville, D. A Campbell, Allan McDonald, John H. McKinnon, Strathshield; Auditors, Angus Gillis, D. A. McLellan..............................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
42	51 14	43 04	129 44	35 59	93 85
19	48 50	42 32	163 01	54 85	108 16
39	63 00	46 28	163 30	103 00	60 30
20	51 50	43 14	102 86	102 86	
16	42 00	40 55	202 76	130 30	72 46
39	60 50	45 60	95 90	77 50	18 40
26	44 00	41 09	250 01	144 00	106 01

Inverness.—President, A. J. McIsaac, Inverness; Vice-President, Geo. F. Cameron, Inverness; Secy-Treasurer, Dan A. McIsaac, Inverness; Directors, A. J. McLellan, H. L. McDougall, J. M. McLeod, John A. Beaton, Inverness Auditors, Rev. A. L. McDonald, P. P.; W. D. Lawrence..

Judique.—President, J. Archie McDonnell, Judique Intervale; Vice-President, Hugh Gillis, Judique North; Secy-Treasurer, John D. McLellan, Judique North; Directors, Angus D. Graham, Judique, John D. McMaster, Rear Judique, William McDonnell, Hillsdale; John D. McIsaac, Judique North, J. A. McDonald, Little Judique.

Margaree Forks.—President, John J. Coady, Margaree Forks; Vice-President, Peter McDaniel, Margaree Forks; Secy-Treasurer, Duncan E. McDonald, Margaree Forks; Directors, A. W. Chisholm, Gabriel Chiasson, Peter J. Coady, Chas. Miller, John A. Chiasson, Margaree Forks; Auditors, M. A. Doyle, Norrie Chiasson................

Margaree Forks.—President, Patrick McDonald, Margaree Harbor; Vice-President, Willie C. Dawson, Margaree Harbor; Secy-Treasurer, Henry A. Ross, Margaree Harbor; Directors, Dan J. McKinnon, Allan K. McLean, Bertie Taylor, Margaree Harbor, Hugh McDonald, Mill Brook; Auditors, Ernest Munroe, Colin McAdam.............

Melford.—President, Alf. McPherson, Upper River Denys; Vice-President, Michael Chisholm, Melford; Secy-Treasurer, John A. McLennan, Melford; Directors, J. D. McPhail, D. O'C. Doyle, Melford; Alex. Chisholm, River Denys Centre; A. R. McPhail, Upper River Denys, Wm. Kennedy, Big Meadow...............................

North East Margaree.—President, John A. Burton, N. E. Margaree; Vice-President, John R. Miller, N. E. Margaree; Secretary, Albert Ingraham, N. E. Margaree, Treasurer, John A. Burton, N. E. Margaree; Directors, James Murphy, Porter Ingraham, Gordon McDonald, Garfield Burton, Henry O. Ingraham, N. E. Margaree; Auditors, John Carmichael, John M. Ross.............

Orangedale.—President, Archibald McPhail, Orangedale; Vice-President, J. D. McNeil, Orangedale; Secretary, D. A. Cameron, Orangedale; Treasurer, F. A. McNeil, Orangedale; Directors, Neil D. Gillis, Murdock McIver, Allan *M.* McLean, D. A. Cameron, Malcolm Martin, Orangedale; Auditors, John D. McNeil, Malcolm Martin...

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
43	60 00	45 46	120 46	23 28	97 18
51	51 00	43 00	458 47	201 92	250 55
36	86 00	52 57	207 29	179 05	28 24
32	48 00	42 19	114 64	80 27	34 37
24	41 50	40 41	98 80	92 80	6 00
40	60 00	45 46	339 39	304 35	35 04
27	71 00	48 47	336 11	205 00	131 11

Port Hawkesbury.—President, F. A. McInnis, Port Hawkesbury; Vice-President, Farquhar McPherson, Port Hawkesbury; Secy-Treasurer, J. J. Williams, Port Hawkesbury; Directors, R. H. Hart, A. C. Chisholm, Port Hawkesbury; Malcolm Campbell, A. E. Morrison, Point Tupper; Auditors, J. A. McDonald, E. C. Embree..............

Port Hood.—President, Rod. McDonald, Port Hood; Vice-President, W. J. Sutherland, Little Mabou; Secy-Treasurer, Angus McPhee, Little Mabou; Directors, John Fraser, Densmore, R. F. McLean, Little Mabou, John Cameron, Densmore, Dan Gillis, Little Mabou, John Campbell, Rocky Ridge..................................

St. Joseph.—President, Germain J. Chaisson, St. Joseph DuMoine; Vice-President, David J. Doucet, Grand Etang; Secretary, John B. J. Chaisson, St. Joseph DuMoine; Treasurer, Simon E. AuCoin, Friar's Head; Directors, Thos. E. Donat, Grand Etang, John P Arsenault, Jos. P. Chiasson, Grand Etang, John S. AuCoin, Friar's Head; Auditors, Gabriel S. Chiasson, Adoply J. Desveaux........

South West Margaree.—President, D. D. McFarlane, S. W. Margaree; Vice-President, Allan McDonald, S. W. Margaree; Secretary, A. J. McDougall, S. W. Margaree; Treasurer, Simon A. Gillis, S. W. Margaree; Directors, James A. McFarlane, Scotsville; Alex. H. Gillis, Upper Margaree; Dan E. Collins, Jas. M. McDonald, A. S. McDougall, South West Margaree; Auditors, J. D. McFarlane, James F. Collins..............................

KINGS COUNTY.

Aylesford.—President, L. R. Patterson, Aylesford; Vice-President, Alex. Patterson, Aylesford; Secy-Treasurer, J. R. Taylor, Aylesford; Directors, James Carey, Auburn S. Harnsell, Jas. Patterson, S. S. Selfridge, Aylesford, Wesley Graves, Auburn; Auditors, Wesley Graves, R. L. Patterson..

Dalhousie East.—President, C. P. Wilson, Dalhousie East; Vice-President, H. S. Taylor, Dalhousie East; Secretary, Robert Wilson, Dalhousie East; Treasurer, W. O. Creighton, Dalhousie East; Directors, John Long, H. S. Taylor, Wallace Conn, V. L. Wright, E. H. Saunders, Dalhousie East; Auditors, E. H. Saunders, Theophilus Mack...

Number of Members	Amount Subscribed	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
46	96 00	55 30	311 89	104 00	207 89
32	58 00	44 92	253 60	201 32	52 28
130	130 00	64 59	442 40	399 75	42 65
30	52 50	43 41	114 44	105 00	9 44
81	203 00	84 55	366 87	203 50	366 87
21	52 90	43 52	133 32	104 94	28 38

Gaspereaux.—President, W. J. Duncanson, Gaspereaux; Vice-President, A. B. Caldwell, Gaspereaux; Secy-Treasurer, P. G. Gertridge, Gaspereaux; Directors, O. N. Caldwell, Otis M. Schofield, Earl Duncanson, W. S. Eagles, Gaspereaux, Lou Davison, Wallbrook; Auditors, K. E. Hunter, C. M. Caldwell........................

Highland.—President, George Brown, North Mountain; Vice-President, Zac West, Halls Harbor; Secy-Treasurer, Chas. Watson, East Halls Harbor; Directors, Rae Bennett, Wm. Wood, B. Porter, Tom Roscoe, Leslie Keizer, East Halls Harbor; Auditors, Rae Bennett, Walter Brown....

Kings County.—President, G. P. Fuller, Hortonville; Vice-President, G. A. Harvey, Grand Pre; Secy-Treasurer, L. H. Curry, Hortonville; Directors, F. E. Fuller, John Lawrence, Grand Pre, Leslie Barron, Hortonville; Ross Fullerton, North Grand Pre, L. F. Fuller, Avonport; Auditors, Miss Annie Stuart.........................

Kingston.—President, E. L. Foster, North Kingston; Vice-President, F. W. Foster, North Kingston; Secy-Treasurer, G. S. Smith, Kingston; Directors, J. E. Smith, Kingston, E. L. Foster, Geo. Tupper, B. W. Cleveland, H. J. Neily, North Kingston; Auditors, J. E. Smith, Geo. Tupper......................................

Morristown.—President, Jas. Felch, Aylesford; Vice-President, H. Irving, Aylesford; Secy-Treasurer, Geo. A. Roland, Aylesford; Directors, Rupert Palmer, Alton Struk, C. D. Fox, C. B. Palmer, Aylesford, Otis Nichols, Morristown; Auditors, Jas. Felch, Otis Nichols...............

Pereaux.—President, E. A. Lewis, Pereaux; Vice-President, J. W. Hubbard, Pereaux; Secretary, L. L. McKeen, Pereaux; Treasurer, J. R. North, North's Corner; Directors, A. O. Sullivan, A. L. Lyons, J. W. Hubbard, R. M. Sanford, M. E. West, Pereaux; Auditors, M. E. Irvin, E. M. Lyons...................................

Sheffield Mills.—President, Robert Rand, Upper Canard; Vice-President, John Kinsman, Sheffield Mills; Secy-Treasurer, W. C. Ells, Sheffield Mills; Directors, Robert Rand, Upper Canard, John Kinsman, C. A. Borden, Sheffield Mills, H. V. Vaughn, W. C. Ells, Sheffield Mills; Auditors, A. D. Ells, P. W. Ells....................

Number fo Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
61	151 00	70 32	483 10	279 75	203 35
44	112 00	59 67	365 78	266 95	98 83
87	123 00	62 67	415 46	208 50	206 96
32	85 00	52 29	139 00	153 20	14 20
21	74 00	49 29	148 30	120 42	27 88
40	91 00	53 93	New	Society	
40	135 00	65 95	248 75	194 60	54 15

Scott's Bay.—President, Owen Steele, Scott's Bay; Vice-President, Clarence Steele, Scott's Bay; Secy-Treasurer, H. L. Corkum, Scott's Bay; Directors, Oxley Steele William Tupper, Daniel Legge, L. A. Huntley, Melbourne Corkum, Scott's Bay; Auditors; J. R. Shaw, M. W. Steele.

South Berwick.—President, R. M. Shaw, Waterville; Vice-President, N. A. Osborne, Waterville; Secy-Treasurer, H. P. Banks, Waterville; Directors, J. N. Chute, Ensley Chute, Berwick, A. S. Banks, Irvin Taylor, Waterville, H. S. Shaw, Berwick; Auditors, N. A. Osborne, R. M. Shaw..

Tremont.—President, E. G. Jefferson, Tremont; Vice-President, M. E. Baker, Tremont; Secy-Treasurer, G. O. Woodbury, Tremont; Directors, Eric Neilly, Torbrook Mines, C. F. Walton, R. E. Saunders, Tremont, Church Ward, Tremont South, Howard Neily, Kingston Village; Auditors, J. A. Banks, Walter McGregor...............

Union.—President, G. R. Pineo, Upper Canard; Vice-President, F. W. Thomas, Upper Canard; Secy-Treasurer, R. O. Harris, Upper Canard; Directors, Walter E. Eaton, Scott Borden, Fred Eaton, Lower Canard, Leander Eaton, Canard, Carl Starr, Port Williams; Auditors, J. E. McGowan, L. R. Burbige.............................

West Cornwallis.—President, W. A. Kinsman, Welsford; Vice-President, F. A. Illsley, Somerset; Secy-Treasurer, A. M. Bishop, Somerset; Directors, A. R. Jordan, Grafton, R G. Power, R. L. Palmer, Welsford, A. L. Reid, Somerset; Auditors, R. S. Spicer, C. C. Bishop.................

LUNENBURG COUNTY.

Bridgewater.—President, A. W. Hebb, Bridgewater, Vice-President, Claude Cook, Bridgewater; Secy-Treasurer, R. B. H. Robertson, Bridgewater; Directors, Cash. Cook; W. K. Cook, Scott Hebb, A. W. Hebb, L. G. Hebb, Bridgewater; Auditors, Claude Cook, Peter Wile.............

Blanford.—President, Harris Publicover, Blanford; Vice-President, Rufus Gates, Blanford; Secy-Treasurer, Solomon D. Zink, Blanford; Directors, Austin Cleveland, Henry Gates, George Fleet, Warren Publicover, Jacob Seaboyer, Blanford; Auditors, Arthur Publicover, Cornelius Zink..

Number of Members-	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
30	91 25	54 00	339 85	136 50	203 35
45	52 00	46 00	188 62	69 50	119 12
33	84 00	52 02	259 05	247 40	11 65
50	161 00	73 06	375 14	280 08	95 06
84	155 00	71 41	245 88	218 27	27 61
150	254 00	98 47	2467 14	1772 39	694 75
54	59 00	45 19	112 59	105 50	7 09

Central.—President, Frank Mulock, Upper LaHave; Vice-President, David Hirtle, Upper LaHave; Secy-Treasurer, W. L. Mulock, Rhodes Corner; Directors, Israel Beck, Upper LaHave, Israel Hirtle, Cephas Densmore, Jas. Densmore, Rhodes Corner, Josiah Robar, Whynots Settlement; Auditors, Chas. Densmore, Robert Randall.............

Centreville.—President, H. S. Barss, Barss' Corner; Vice-President, R. D. Webber, Barss' Corner; Secy-Treasurer, J. L. DeLong, Barss' Corner; Directors, W. W. Crandall, C. R. DeLong, C. R. Grant, Allister DeLong, Barss' Corner; E. H. Nichols, Union Square; Auditors, M. B. DeLong, L. J. Dunn..........................

Chester.—President, John A. Webber, Chester; Vice-President, Abner Webber, Chester; Secretary, E. D. Lordly, Chester; Treasurer, J. E. Whitford, Chester; Directors, Urban Stevens, Freeman Pulsifer, Dennis, Stevens, Augustus Whitford, Edgar Hume, Chester; Auditors, Colman Smith, Henry E. Hitchell..........................

Dublin Shore.—President, Geo. R. Conrad, LaHave; Vice-President, David Wilkie, LaHave; Secy-Treasurer, A. S. Himmelman, LaHave; Directors, Daniel Getson, G. W. Zwicker, LaHave, Wm. O'Brien, Phineas Richard, Edwin Pentz, Pentz P. O.; Auditors, G. W. Zwicker, Jeffrey P.. Publicover.....................................

Farmers.—President, Nathan Wentzell, Maplewood; Vice-President, R. B. Wentzell, Maplewood; Secy-Treasurer, H. A. Rafuse, Parkdale; Directors, H. N. Wentzell, Maplewood, G. F. Rafuse, James Frank, Parkdale, S. B. Wentzell, A. W. Baker, Maplewood..................

Isle of the Sea.—President, Alvin Cross, Tancook; Vice-President, H. B. Slaunwhite, Tancook, Secretary, R. B. Stevens, Tancook; Treasurer, A. H. Slevins, Tancook; Directors, Ainsley Baker, Hibbert Baker, Hibbert Langille, Ben Langille, Leander Cross, Tancook; Auditors, Wm. Cross, Reuben Heisler............................

Lakeside.—President, P. W. Thompson, New Cornwall; Vice-President, Alden Barkhouse, New Cornwall; Secretary, A. W. Dauphinee, New Cornwall, Treasurer, Joshia Bruhn, New Cornwall; Directors, Banford Robar, Amos Dory, Esrom Spidle, Daniel Daurie, Augustus Ernest, New Cornwall; Auditors, Ephriam Naas, Alden Barkhouse, New Cornwall.................................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
45	66 00	47 10	139 41	116 00	23 41
72	169 50	75 39	335 80	291 47	44 33
77	88 75	53 32	298 25	291 88	6 37
46	102 00	56 93			
42	92 00	54 20	196 38	250 75	54 37
48	57 00	44 64	381 04	323 54	57 50
41	50 50	42 87	170 45	137 70	32 75

LaHave River.—President, Albert Rhodenizer, West Northfield; Vice-President, A. F. Smith, Cook's Branch; Secy-Treasurer, Wallace Rhodenizer, West Northfield; Directors, George Hirtle, Calud Cook, Mark Rhodenizer, Wilson Conrad, Uriah Keizer, West Northfield; Auditors, A. F. Smith, Uriah Keizer............................

Lapland.—President, Garfield Crouse, Lapland; Vice-President, Phillip Crouse, Lapland; Secy-Treasurer, Elijah Hirtle, Lapland; Directors, Edgar Hirtle, Leroy Crouse, Harold Wile, Lapland, Morris Wile, Waterloo, Silas Deal, Laconia; Auditor, Chas. Vaughn........................

Lewiston.—President, Geo. Rafuse, Mill Road; Vice-President, Bennet Walker, New Ross; Secy-Treasurer, W. E. Hirtle, Mill Road; Directors, Richard Veniotte, Mill Road, Wallace Russell, Harvey Walker, John Broom, Bernard Walker, New Ross; Auditors, Chas. Russell, John Brown..

Mahone Bay.—President, H. W. Lane, Mahone Bay; Secretary, C. U. Mader, Mahone Bay; Treasurer, John H. Mader, Mahone Bay; Directors, Ralph Mader, Azom Ernest, Blockhouse, Azriah Kaulback, Oakland, Simeon Zwicker, Reuben Smeltzer, Mader's Cove...............

Maitland.—President, Chas. Barry, Barry's Corner; Vice-President, Jas. J. Eichel, Barry's Corner; Secy-Treasurer, N. W. Eichel, Barry's Corner; Directors, Archibald Barry, Barry's Corner, Artemus Joudrey, John Falkenham, Bridgewater, Collin Langille, Blockhouse, Wallace Slaunwhite, Sweetland; Auditors, William Veniot, William Barry...

Malagash.—President, R. A. Backman, Lunenburg; Vice-President, Adam Knickle, Heckman's Island; Secy-Treasurer, Willie J. Anderson, Lunenburg; Directors, Henry Myra, Garden Lots, Kenneth Crouse, South Garden Lots, Robert Swartz, A. E. L. Fritze, Lunenburg, Harold Rhodenizer, South Lunenburg...................

Midville—President, Jas. Snyder, Midville Branch; Vice-President, Howard Whetaell, Midville Branch; Secretary, Jacob Snyder, Midville Branch; Treasurer, Albert Snyder, Midville Branch; Directors, Robert Maulman, Henry Emens, Midville Branch, Blanford Snyder, Archie Hebb, Midville Branch; Josh Meldrum, Upper Branch; Auditors, Hallett Mailman, Lem Smith................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
34	76 00	49 83	159 43	160 00	57
28	75 00	49 56	158 34	128 87	29 41
34	40 25	40 07	212 78	83 66	129 12
197	215 00	87 82	805 97	469 55	336 42
54	66 00	47 10	113 91	121 58	7 77
121	179 00	77 97	649 19	407 55	241 64
54	81 00	51 20	230 14	142 28	87 86

New Ross.—President, H. A. Meister, New Ross; Vice-President, D. M. Turner, New Ross, Secy-Treasurer, O. S. Elliott, New Ross; Directors, John A. Meister, W. W. Keddy, John R. Meister, Patrick Baylor, Levred Russell, New Ross; Auditors, Capt. A. M. Ross, Aaron Elliott..

Nineveh.—President, James Veniotte, Nineveh; Vice-President Arthur Lhomes, Nineveh; Secy-Treasurer, T. W. Johnson, Hemford; Directors, Lewis Smith, Dennis Silver, James Silver, Hemford; Obediah Wile, Simpsons Corner, Austin Wile, Hemford; Auditors, Uriah Mailman, Obediah Wile..

North West.—President, Dennis Eisener, North West; Secy-Treasurer, Allan Schnare, North West; Directors, Charles Schnare, North West, Anthony Cantelope, North West; Nathan Young, Martin's Brook.................

Oak Hill.—President, H. A. Silver, Oak Hill; Vice-President, W. W. Ernest, Bridgewater; Secy-Treasurer, J. E. Rooke, Bridgewater; Directors, Amos Langille, Bridgewater, Salter Sorette, Chas. Spidle, Stanley Rounding Bridgewater, Titus Rhodenizer, Oak Hill; Auditors, Wm. Silver, Wm. Whynot.............................

Riverside.—President, J. F. Penny, New Germany; Vice-President, Wm. Eisener, New Germany; Secy-Treasurer, D. W. Morton, New Germany; Directors, Stanley Jefferson, Gabriel Whynot, Chas. Warner, Kenneth Knox. Harry McKay, New Germany; Auditors, A. H. Woodworth, A. B. Feindel...................................

Union.—President, Casper Hirtle, Hemford; Vice-President, Aulden Mailman, Hemford; Secy-Treasurer, Herbert Silver; Directors, Rufus Zink, Aseph Wagner, Harvey Mailman, E. W. Mailman, James Smith, Hemford; Auditors, Aulden Mailman, Harvey Mailman..................

United Farmers.—President, Colins Herman, Herman's Island; Vice-President, Stephen Roach, Herman's Island; Secy-Treasurer, A. E. L. Fritze, Lunenburg; Directors, Jos. Herman, Chas. Herman, Howard Baker, Chas. Smeltzer James Joudrey, Lunenburg; Auditors, Wm. Meisner, Wm. Smeltzer..

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts	Total Expenditure	Balance
75	81 00	51 20	294 74	159 14	135 60
57	62 00	46 00	New	Society	
41	47 00	41 91	New	Society	
44	75 50	49 70	222 96	183 00	39 96
56	56 00	44 37	248 91	245 50	3 41
42	55 50	44 23	123 62	90 50	33 12
15	50 00	42 73			

Upper Northfield.—President, Aseph McKay, Upper Northfield; Vice-President, Henry Oikle, Upper Northfield; Secretary, Reginald McKay, Upper Northfield; Treasurer, Aseph McKay, Upper Northfield; Directors, Harry Meisner, West Northfield; Geo. Penny, Arch. Penny, Arthur Veniotte, Locke McKay, Upper Northfield; Auditors, Geo. Penny, Leander Veniotte................

West Northfield.—President, Robert Wentzell, West Northfield; Vice-President, S. M. Ramie, West Northfield; Secy-Treasurer, John Langille, West Northfield; Directors, Linden Feener, Hibbert Wentzell, Wentzell's Lake, Perlie Veniotte, Wm. S. Sarty, Hugh Rhodenizer, West Northfield; Auditors, Wm. J. Wentzell, Obed Dauphinee............

PICTOU COUNTY.

Big Island.—President, John McLean, Big Island; Vice-President, Wm. McGregor, Big Island; Secy-Treasurer, Ewen Cameron, Big Island; Directors, Wm. McGee, J. F. McDonald, Laughlin McLean, J. T. McGregor, Herbert Smith, Big Island; Auditors, Daniel McLean, A. G. McGregor..

East River.—President, A. E. McDonald, Bridgeville; Vice-President, John Cameron, Bridgeville; Secy-Treasurer, Sinclair Cameron, Bridgeville; Directors, Rod Chisholm, Bridgeville, P. L. Lithgow, Bridgeville, Baxter Campbell, Springville, Joseph Delorey, J. Edwin McKeen, Big Island; Auditors, William Fraser, S. C. Fraser...........

Edgerton.—President, Chas. Matheson, Hopewell; Vice-President, Mowatt McKay, Riverton; Secretary, H. D. McLeod, Hopewell; Treasurer, A. G. McKay, Hopewell; Directors, Samuel McKay, J. C. McDonald, D. H. McKay, J. H. Fraser, Hopewell, Johnson Cameron, Riverton......

Elmfield and Plainfield.—President, W. A. Graham, R. R. 1, Scotsburn; Vice-President, John W. Graham, R. R. 2, Scotsburn; Secy-Treasurer, C. R. McKay, R. R. 1, Scotsburn; Directors, H. A. McCara, Bert McIntosh, R. R. 2, Scotsburn, Alex. McDonald, Chas. Sutherland, R. R. 2, Scotsburn; Auditors, J. H. McKenzie, Dan McKay.

Lismore.—President, Geo. R. McDonald, Knoydart; Vice-President, Alex. McGillvray, Lismore; Secy-Treasurer, John H. McDonald, Box 25, R. M. D. Merigomish; Directors, John D. McKinnon, John D. McDonald, Alex. McGillvray, Alex. C. D. McKinnon, James McGillvray, Lismore; Auditors, Ronald McGillvray, W. C. McKinnon..........

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
64	67 00	47 38	195 50	213 46	17 96
56	78 00	50 38	161 06	197 04	35 98
18	42 50	40 60	100 24	53 00	47 24
16	42 50	40 68	245 29	256 75	11 46
31	120 00	61 85	521 63	253 28	268 35
20	40 00	40 00	92 27	79 62	12 65
15	46 50	41 78	91 17	76 97	14 20

Little Harbor.—President, John C. Reid, Little Harbor; Vice-President, Alex. Reid, Little Harbor; Secy-Treasurer, Alex. McQueen, Kings Head; Directors, John D. Grant, D. P. McDonald, D. A. McQueen, Kings Head, G. A. Melus, Woodburn, Stanley Powell, Little Harbor; Auditors, John McDonald, F. H. McNeil..........................

Lyons Brook.—President, C. D. Gammon, Lyons Brook; Vice-President, J. R. Hislop, Lyons Brook; Secy-Treasurer, G. W. Grant, Lyons Brook; Directors, Peter McInnes, Alex. Morrison, Geo. Stevenson, Lyons Brook; R. Fullerton, Pictou; Auditors, A. D. McKay, Peter McInnes..........

Marshville, President, Cyrus Langille; Vice-President, Calvin Langille, Marshville; Secy-Treasurer, Amos C. Tattrie, Marshville; Directors, H. W. Langille, C. W. Langille, R. A. McKay, Wm. Tattrie, Jas. I. Langille, Marshville· Auditors, Rod McDonald, C. D. Langille..........

Maxwelton.—President, Geo. W. McKay, Lower Barney's River; Vice-President, C. R. Smith, Central Ponds; Secy-Treasurer, Geo. D. Smith, Lower Barney's River; Directors, Jas. W. Arbuckle, A. R. Murdock, Ponds, Geo. D. Smith, David Patterson, Lower Barney's River; Auditors, Geo. W. Thompson, R. McG. Patterson..........

Meadowville.—President, John D. McConnell, Meadowville, R. R. 1; Vice-President, Wetson McDonnell, Meadowville Station; Secy-Treasurer, Jas. H. Murray, Meadowville, R. R. 2; Directors, Jas. Cotter, John W. Murray, J. W. McIntosh, W. A. Roe, Meadowville, R. R. 1; Auditors, Geo. E. Fraser, Jas. W. McBain................

Merigomish.—President, Renwick Forbes, Merigomish; Vice-President, Alfred McEwen, Merigomosh; Secy-Treasurer, David Finlayson, Merigomish; Directors, Samuel Cameron, Wm. McGregor, Malcolm DeWolfe, Forrest Finlayson, Geo. Roy, Merigomish......................

Mill Brook.—President, David Ferguson, Gairloch; Vice-President, John L. Munroe, Mill Brook; Secretary, A. J. McIntosh, Mill Brook; Treasurer, John M. Gordon, Mill Brook; Directors, Hector McKenzie, Alex. D. McKenzie, Gairloch, John W. McDonald, Lovat, Wm. S. Fraser, Wm. H. Fraser, Mill Brook.........................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
30	60 00	45 46	223 21	172 92	50 29
22	51 60	43 17	173 45	230 95	57 50
20	79 00	50 65	126 01	125 55	46
20	42 00	40 55	161 13	188 55	27 42
20	40 75	40 20	90 07	81 25	8 82
23	45 00	41 37	189 00	134 52	54 48
32	70 00	48 20	122 31	93 00	29 31

Mount Thom.—President, W. D. McDonald, Lowe Mount Thom; Vice-President, Chas. Fraser, Salt Springs; Secy-Treasurer, Colin McGillvray, Salt Springs, R. R. 1; Directors, D. R. Fraser, Leslie Cameron, N. E. Fraser, Salt Springs, R. R. 1, C. A. Maxwell, Lower Mount Thom, W. D. McLeod, Waterville; Auditors, W. D. Maxwell, J. D. Sinclair...

New Glasgow,—President, J. W. McDougall, New Glasgow; Vice-President, E. A. Fraser, New Glasgow; Secy-Treasurer, Don F. Fraser, New Glasgow; Directors, Alex. Logan, John R. McMillan, R. McG. Murray, New Glasgow, Robert Johnson, Wm. McLennan, Plymouth; Auditors Peter McFarland, Don G. Sinclair.......................

Pictou.—President, Hugh Sutherland, Pictou; Vice-President, A. McG. Fraser, Pictou; Secy-Treasurer, D. Logan, Pictou; Directors, W. D. Smith, Pictou, R. D. Ross, Bayview, Neil McDonald, Central Carribou, Simon McKenzie, Waterside, Wm. D. Grant, Bayview R. R. 3; Auditors, Peter Fraser, J. F. Carson...................

Pictou Island.—President, Chas. McCallum, Pictou Island; Vice-President, John McDonald, Pictou Island; Secy-Treasurer, L. Rankin, Pictou Island; Directors, Hector McDonald, T. McLean, Robert McFarland, William McLean, Pictou Island...............................

Pine Tree.—President, D. Burns, West Merigomish; Vice-President, W. Harris, Sutherland's River; Secy-Treasurer, Thos. Beveridge, Box 943, New Glasgow; Directors, D. Robertson, W. P. Reid, Thornburn, J. Simmonds, Sutherland's River, A. Grant, West Merigomish; Auditors, E. T. King, W. P. Reid...............................

River John.—President, J. R. Colter, River John; Vice-President, H. H. Sellars, River John; Secy-Treasurer, Wm. McGregor, River John; Directors, H. M. Tattrie, Jas. Sellars, J. R. Sutherland, Wm. McLean, B. S. Langille, River John.......................................

Riverview.—President, D. L. Robertson, Avondale; Vice-President, Stewart Robertson, Barney Rivr Station; Secy-Treasurer, F. H. McDoald, Avondale; Directors, H. F. McDonald, Russell Fisher, J. W. McPhee, R. H. Cunningham, Marshall Williams, Avondale; Auditor, Leonard Day.....................................

Number of Members	Amount Subscribed	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
24	77 35	50 20	190 87	131 00	69 87
83	184 75	79 55	486 31	397 96	88 35
90	170 00	75 52	423 01	143 14	279 87
15	41 00	40 27	197 17	131 32	65 85
30	57 24	44 71	158 10	102 79	55 21
82	154 50	71 28	180 75	230 21	49 45
25	43 50	40 95	166 72	163 89	2 83

Rocklin.—President, E. Fraser, Westville; Vice-President, G. T. Kerr, Westville; Secretary, G. W. McLeod, Westville; Treasurer, J. G. Sutherland, Westville; Directors, J. T. Kerr, J. G. Sutherland, J. J. Collie, J. J McKenzie, Westville, D. Balflour, R. R. 2, Glengarry; Auditors, J. T. Kett, J. G. Sutherland . . . .

Rogers Hill.—President, Wm. Stewart, Scotsburn; Vice-President, Geo. W. McKenzie, Scotsburn, R. R. 2; Secy-Treasurer, W. S. McKean, Pictou, R. R. 2; Directors, John Stewart, W. E. Murray, Daniel Cameron, Scotsburn, John A. McKean, Scotsburn, R. R. 2, Wm. Carson, Scotsburn, R. R. 3 . . . .

Salt Springs.—President, W. H. Gass, Salt Springs; Secy-Treasurer, R. L. Benvie, West River Station; Directors, Harry Brown, Salt Springs, R. L. Benvie, West River Station, T. B. Moreland, G. H. McLean, Salt Springs . . . .

Seaview.—President, D. R. McGillvray, Dunmaglass; Vice-President, H. D. McDonald, Ardness; Secy-Treasurer, D. R. McKinnon, Ardness; Directors, R. A. McGillvray, A. B. McGillvray, Angus McEachern, Ardness; Auditor, A. J. McGillvray . . . .

Strathsfield.—President, D. D McGillvray, Bailey Brook; Vice-President, John McKinnon, Bailey Brook; Secy-Treasurer, D. L. McDonald, Bailey Brook; Directors, Lewis McDonald, Hugh A. McDonald, Hugh C. McDonald, Allan McGillvray, Archie McEachern, Bailey Brook; Auditors, D. W. McLean, John McKinnon . . . .

Toney River.—President, Geo. R. McConnell, River John R. R. 4; Vice-President, John A. Colquhoun, Meadowville R. R. 2; Secy-Treasurer, Daniel A. McKenzie, Meadowville, R. R. 2; Directors, Mark Bowran, Chas. Archibald, John B. Paige, Dan A. McDonald, Meadowville, R. R. 2; Jas. Elliott, River John R. R. 4; Auditors, John Henderson, John D. McMillan . . . .

Union Centre.—President, J. J. Crawford, Union Centre Vice-President, Warren McKenzie; Secretary, Wm. Harris, Union Centre; Treasurer, Wm. Grey, Union Centre; Directors, John McNeil, Thos. Hamilton, Geo. Ross, John Munro, Robt. McLeod; Auditors, Alex. Ross, Warren McKenzey . .

Number fo Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
15	40 00	40 00	170 00	162 49	7 51
23	46 00	41 64	246 72	210 25	36 47
15	58 00	44 92	80 00	80 00	
18	42 50	40 68	115 66	102 60	13 06
27	40 50	40 14	88 26	68 00	20 26
21	48 25	42 25	258 31	217 49	40 82
20	42 50	40 68	96 06	59 47	36 59

West Branch.—President, J. W. Ross, West Branch; Vice-President, Thos. Harbourn, West Branch; Secy-Treas., Murdock Sutherland, West Branch; Directors, Thos. G. Murray, Hugh R. Ross, Warren Rae, Jas. N. McLean, Hugh McLean, West Branch; Auditors, Hugh McLean, Thos. Harbourn..............................

West River.—President, A. H. Clarke, Pictou, R. R. 2; J. T. Proudfoot, Pictou R. R. 2; W. O. Creighton, West River Station, R. R. 1; Directors, Geo. J. Stewart, Geo. Brownregg, Stewart McLellan, Pictou R. R. 2; Scott Grant, Wm. McLean, West River Stgtion, R. R. 1..............

West River Station.—President, Wm. Graham, West River Station; Vice-President, John R. McDonald, Waterville; Kenneth M. Ross, West River Station; Directors, Geo. W. McBeth, John R. McBeth, Wm. Tupper, Simon Fraser, West River Station, Neal R. Matheson, Waterville; Auditors, Wm. Baillie, John M. Campbell..............

Westville.—President, Jas. D. McCoull, Westville; Vice-President, R. C. Munroe, Westville; Secretary, John K. McKenzie, Westville; Treasurer, Alfred P. McLean, Westville; Directors, Geo. Oliver, Wm. Herbert, Henry Marshall, Daniel Robertson, Westville; R. A. Douglas, Alma; Auditors, R. A. Douglas, J. D. Fraser............

QUEENS COUNTY.

Kempt.—President, M. U. Freeman, Kempt; Vice-President, Samuel Luxton, Kempt; Secy-Treasurer, H. J. Freeman, Kempt; Directors, W. P Freeman, New Grafton, David DeLong, Melbourn Luxton, Samuel Luxton, Kempt; Auditors, W P. Freeman, M. U. Freeman..............

Mutual Benefit.—President, N. W. Frank, North Brookfield; Vice-President, A. W. Handey, North Brookfield; Secy-Treasurer, F. C. Hunt, North Brookfield; Directors, E. H. Silver, North Brookfield; J. J. Farquhar, C. H. Harloe, Carleton Freeman, Jas. Crouse, North Brookfield...

North Queens.—President, G. W. Rafuse, Caledonia; Vice-President, Z. F. Minard, Caledonia; Secy-Treasurer, E. P. Cushing, Caledonia; Directors, E. B. Smith, A. L. Smith, J. L. Rafuse, Owen Seldon, Stanley Ball, Caledonia.

Number of Members-	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
41	135 50	66 09	214 64	234 30	19 66
16	44 50	41 23	188 77	57 40	131 37
21	40 00	40 00	106 67		
55	155 00	71 41	270 30	266 30	4 00
35	43 00	40 82	116 53	81 00	35 53
15	49 00	42 46	172 45	171 76	69
30	41 50	40 41	151 50	88 58	62 92

Pleasant River.—President, Lloyd Colp, Pleasant River; Vice-President, M. F. Colp, Colpton; Secy-Treasurer, Freeman Waterman, Pleasant River; Directors, John Smith, A. M. Frank, Pleasant River, Henry Wile, Brookfield Mines, M. F. Colp, B. F. Colp, Colpton; Auditors, Zacariah Smith, Wilson Freeman..............................

South Brookfield.— President, J. W. Smith, South Brookfield; Vice-President, L. A. DeMond, South Brookfield; Secy.-Treasurer; S. P. Smith, South Brookfield; Directors, Chas. Cameron, W. Freeman, L. A. Corkum, Chas Steves, Robt. Smith, South Brookfield............

RICHMOND COUNTY

Arichat.—President, Rev. G. A. Andrew, Arichat; Vice-President, John Tyrell, Arichat; Secy-Treasurer, James D. Power, Arichat; Directors, E. C. Doyle, M. B. McNeil, Nelson Dobson, Reynolds Smith, T. Tonquez, Arichat; Auditors, E. C. Doyle, Nelson Dobson..........

Arichat East.—President, Alex Edward, Arichat; Vice-President, G. Gallant, Arichat, Secy-Treasurer, Chas. Marchand, Arichat; Directors, L. Landry, Daniel Boudreau, Edward Landry, Jeffrey Doucet, A. D. Sampson, Arichat; Auditors, Fred Sampson, Edgar Thibeaut.............

Barra Head.—President, Rev. R. L. McDonald, St. Peters; Vice-President, Jas. E. Harris, Barra Head; Secy-Treasurer, Ernest McNeil, Barra Head; Directors, Jas. Cameron, Henry Langley, John D. McNeil, Dan B. McLean Alex. McDonald, Barra Head; Auditors, Wm. A. McDonald, John Arsenault...................................

D'Escousse.—President, Rev. Wilfred A. Bouchei, D'Escousse; Vice-President L. L. Pertus, Poulamond; Secy-Treasurer, Edward Doyle, Poulamond; Directors, L. N. Poirier, Elias McDonald, Felix Landry, Lennox Levascount, D'Escousse, Matthew Britton, Porrierville; Auditors, Peter Dunn, Alfred Pertus.........................

Grand Anse.—President, D. D. Buchanan, Grand Anse; Vice-President, M. McDonald, Grand Anse; Secy-Treasurer, D. A. McRae, Grand Anse; Directors, Murdock McPherson, D. H. McDougall, Dan Ferguson, G. J. Hill, Malcolm McPhail, Grand Anse; Auditors, M. J. McDonald, John A. McRae......................................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
26	84 00	52 03	230 66	230 90	24
54	94 50	54 89	213 75	234 50	20 75
45	49 50	42 60	129 45	92 25	34 20
40	40 00	40 00	102 06	102 30	24
24	54 00	43 82	87 91	78 39	8 52
92	108 00	58 58			
20	43 50	40 96	206 97	187 10	19 87

Grand River.—President, Dan J. Matheson, Grand River West; Vice-President, Archy C. McBeth, Grand River West; Secy-Treasurer, Alex. G. McKay, Grand River West; Directors, Alex. D. McKay, R. C. Matheson, A. R. Urquhart, Grand River West, Wm. Kempt, L'Archeveque, Alex. Matheson, J. L. McAulay..........

Irish.—President, Jas. Johnston, Red Islands; Vice-President, J. C. Cash, Irish Cove; John J. Johnston, Red Islands; Directors, Jas. D. Campbell, John S. McKenzie, D. J. McNeil, Red Islands, Michael Campbell, Jerry McMillan, Irish Cove; Auditors, M. J. McDonald, Murdock McKenzie..

Kempt Road and Cleveland.—President, Duncan McMillan, Kempt Road; Vice-President, Jas. N. McLellan, Kempt Road; Secy-Treasurer, John A. McLeod, Kempt Road, Hugh A. McLeod, Hugh Campbell, Kempt Road; Auditors, J. W. McLay, Alex. McMillan...............

Louisdale.—President, Alfred Sampson, Louisdale; Vice-President, J. Scott Nelson; Secy-Treasurer, Thos. T. Sampson, Louisdale; Directors, Henry White, Wm. Bugler, Lawrence B. Sampson, Miller March, Edward Sampson, Louisdale...

Oban.—President, J. R. McDonald, Oban; Vice-President, Alex. N. McDonald, Oban; Secretary, D. L. Stewart, Oban; Treasurer, D. A. McDonald, Oban; Directors, H. D. Pringle, Roberta, John McPhail, John A. Murray, A. McDonald, Thos. Morrison, Oban; Auditors, A. N. McDonald, Angus M. Morrison.......................

Pondville.—President, Peter Wilson, Pondville; Vice-President, John Hearn, Pondville; Secy-Treasurer, Wm. Dunphy, Pondville; Directors, Desrie Marchand, Robert McPherson, John F. Edwards, Felix Fougere, Wm. Courdo, Pondville.....................................

Port Royal.—President, Chas. P. Forgeron, Port Royal; Vice-President, Peter Terio, Port Royal; Secretary, Alban Poirier, Port Royal; Treasurer, Alex. F. Boudrat, Port Royal; Directors, Hugh McEachern, Arthur Rogers, Alex. Marchand, Fred Frank, Joseph LeBlanc, Port Royal; Auditors, Capt. Chas. LeBlanc, John Frank...........

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
16	40 00	40 00	203 85	118 15	85 70
40	56 00	44 37	93 39		
26	48 00	42 19	187 03	127 22	59 81
43	43 00	40 82	93 01	20 20	72 81
17	40 00	40 00	New	Society	
45	45 00	41 37	New	Society	
50	50 00	42 73	91 70	163 10	71 40

Progressive Farmers.—President, Wm. G. Manger, Rocky Bay; Vice-President, Patrick Kehoe, Rocky Bay; Secretary, Lennox H. T. Manger, Cap La Ronde; Tresaurer, John F. Manger, Rocky Bay; Directors, Thos. Magner, Wm. Latimer, Cap La Ronde, James Manger, Wm. Hearn, Thos. Kehoe, Rocky Bay; Auditors, Thos. Manger, Wm. Latimer..

River Bourgeoise.—President, Joseph D. Bourque, River Bourgeoise; Vice-President, Alex. Samson, River Bourgeoise; Secy-Treasurer, Willie H. Robertson, River Bourgeoise; Directors, Rev. P. Robitaille, Andrew Robertson, Jas. H. Samson, D. Samson, D. Beranger, River Bourgeoise.

Seaview.—President, S. Geo. Davis, Seaview; Vice-President, Peter A. Thibeau, Seaview; Secy-Treasurer, D. A. Sutherland; Directors, John Goswell, John Morrison, John McLeod, D. P. Morrison, Seaview...............

St. Peters.—President, K. M. Matheson, St. Peters; Vice-President, W. L. Wright; Secy-Treasurer, D. J. Ferguson, St. Peters; Directors, A. J. McCuish, David O'Toole, W. E. Morrison, St. Peters; Auditors, C. M. Morrison, John K. Hill...

Soldier's Cove.—President, R. L. McDonald, Soldier's Cove; Secy-Treasurer, Stephen T. Thomas, Soldier's Cove; Directors, Allan H. McDonald, Alex. A. McDonald, William McDonald, John F. Gillis, William Sutherland, Soldier's Cove; Auditors, Martin Gillis, Peter McKenzie.........

West Arichat.—President, Benjamin Samson, West Arichat; Vice-President, Capt. B. Gerrior, West Arichat; Secretary, W. H. LeBlanc, West Arichat; Treasurer, J. H. Poirier, West Arichat; Directors, Rev. J. E. Robitaille, Chas. Forrest, Jas. McDonald, Fred Babin, C. J. Terrio, West Arichat....................................

West Bay.—President, Peter Dunphy, St. George's Channel; Vice-President, Murdock McInnis, St. George's Channel; Secretary, F. C. Cotton, St. George's Channel; Directors, Alex. A. Campbell, Benjamin McKenzie, Points West Bay; Wm. H. Ross, John D. McRae, Dan Cameron, St. George's Channel; Auditors, John W. McRae, Dan Cameron.....................................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts	Total Expenditure	Balance
40	58 50	45 05	247 16	254 47	7 31
52	131 00	62 13	New	Society	
20	40 00	40 00	New	Society	
53	57 00	44 64	New	Society	
22	44 00	41 09	140 66	121 51	19 15
61	87 00	52 84	134 14	180 28	46 14
21	60 50	45 60	134 90	70 65	64 34

SHELBURNE COUNTY.

Barrington Passage.—President, D. W. Sargeant, Barrington Passage; Vice-President, T. W. Robertson, Barrington Passage; Secy-Treasurer, Arthur Christie, Barrington Passage; Directors, J. R. Gammon, J. H. Christie, Barrington Passage, Andrew Hopkins, N. L. Smith, John Lyons, Cornwells; Auditors, G. N. Smith, A. C. Robertson......

Shelburne.—President, Howard A. Harris, Welshtown; Vice-President, Lorenzo Jones, Upper Ohio; Secy-Treasurer, Wm. K. Hood, Shelburne; Directors, L. W. Fuller, W. I. Farquhar, A. N. Swansburg, Shelburne, F. W. Bower, Henry Bower, Lower Ohio; Auditors, F. C. Blanchard, R. A. Bruce...................................

Baddeck Bridge.—President, Duncan McRae, Baddeck Bridge; Vice-President, A. D. McCharles, Baddeck Bridge; Secy-Treasurer, Angus McKay, Baddeck Bridge; Directors, F. A. McRae, Edgar F. McRae, Alex. J. McRae, Duncan F. McRae, Alex. D. McRae, Baddeck Bridge; Auditors, F. A. McRae, Duncan F. McRae.......................

Baddeck Valley.—President, Jas. T. Keily, Baddeck Bridge; Vice-President, Colin J. Nicholson, Baddeck Bridge; Secy-Treasurer, Murdock R. McLeod, Baddeck Bridge; Directors, Duncan Gillis, E. P. Rice, Dan McInnis, Farquhar Buchannan, Forks Baddeck, Abner Crowdis, Baddeck Bridge; Auditors, Abner Crowdis, Colin J. Nicholson....

Cape North.—President, Arthur McEvoy, Cape North; Vice-President, Archie McDonald, Cape North; Secy-Treasurer, N. A. McDonald, Cape North; Directors, Tingley McEvoy, J. D. Morrison, W. E. Harris, J. E. McLeod, Allan Campbell, Cape North; Auditors, J. H. Campbell, Kenneth McKinnon.......................

Hunter's Mountain.—President, A. J. Cain, Hunter's Mountain; Vice-President, Neil C. McIver, Hunter's Mountain; Secy-Treasurer, A. F. McRae, Myanza; Directors, John Foyle, Hunter's Mountain; Hector Morrison, Nyanza, Angus McLeod, H. G. Matheson, John A. McDonald, Hunter's Mountain; Auditors, A. F. McRae, H. G. Matheson....................................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
37	48 75	42 39	175 52	201 05	25 53
86	86 00	52 57	1442 38	1276 58	165 80
16	40 00	40 00	120 67		
22	61 50	45 87	89 70	105 00	16 29
32	68 00	47 65	199 25	125 31	73 94
20	75 00	49 56	115 28	114 92	36

Iona.—President, Rev. R. McKenzie, P. P., Iona; Vice-President, Dan A. McDonald, St. Columbia; Secy-Treasurer, John R. Campbell, Jamesville West; Directors, Neil R. Campbell, Jamesville West, Stephen McNeil, Iona, Paul McKinnon, Rear Iona, Jas. A. McNeil, Gillis Point, Francis McNeil, Broad Glen; Auditors, Edward A. McNeil, Rory A. McNeil..

Lakeview.—President, H. M. Crowdis, Baddeck; Vice-President, Geo. R. Anderson, Baddeck; Secy-Treasurer, J. E. Campbell, Baddeck; Directors, J. S. McLean, Ruth McPherson, Chas. McAskill, A. J. McDonald, A. S. McDonald, Baddeck; Auditors, G. J. McRae, A. S. McDonald

Middle River.—President, Forbes McDonald, Upper Middle River; Vice-President, Geo. E. Ingraham, Upper Middle River; Directors, Kenneth Finlayson, Rory J. McRae, Rory McLeod, John A. McDonald, Dan McDonald, Upper Middle River; Auditors, John A. McDonald, Kenneth Finlayson......................................

YARMOUTH COUNTY.

Brookside.—President, John Smith, East Pubnico; Vice-President, Angus Hines, East Pubnico; Secy-Treasurer, Chas. S. Wyman, East Pubnico; Directors, Thos. Adams, Loran Smith, Geo. Fox, Arthur D'Entremond, Lawrence Amio, East Pubnico; Auditors, Geo. Fox, Loran Smith....

Kemptville.—President, Arthur L. Roberts, Kemptville; Vice-President, C. L. Roberts, Kemptville; Secy-Treasurer, A. M. Gates, Kemptville; Directors, Sylvanus Crowell, Wm. Randall, Chas. Ring, Leslie Prosser, John Ring, Kemptville; Auditors, Wm. Goodwin, Melvin Reeves.

Yarmouth County.—President, E. K. Spinney, Yarmouth; Vice-President, S. A. Cook, Central Chebogue; Secy-Treasurer, William Corning, Yarmouth; Directors, J. L. Lovitt, J. M. Porter, J. F. Palmer, John C. Corning, Walter Churchill, Yarmouth; Auditors, W. A. Godfrey, M. C. Wyman.......................................

Yarmouth Township.—President, John McCormick, Wellington; Vice-President, Chas. M. Rogers, Hebron; Secretary, W. A. Churchill, Lakeside; Treasurer, Asa Porter, Hebron; Directors, E. McCormick, Wellington, A. Porter, F. Crowell, Thos. Moses, Hebron; Auditors, H. Hiliard, C. A. Porter.......................................

Number of Members.	Amount Subscribed.	Grant in Aid.	Total Receipts.	Total Expenditure	Balance.
26	52 00	43 28	121 64	19 75	101 89
21	42 00	40 55	297 24	66 00	231 24
19	47 50	42 05	222 86	114 02	108 84
65	87 75	53 04	264 22	138 05	126 17
87	203 00	84 53	336 57	309 54	27 03
397	615 00	197 08	4162 33	3656 36	505 97
27	102 00	56 94	455 31	166 61	288 70

REPORT OF THE FIELD CROPS COMPETITION FOR THE YEAR 1917.

Notwithstanding the fact that the past season was unfavorable for the growth of most crops, particularly in some parts of the Province, we are pleased to report the largest entry on record. Although the entries were the largest since these competitions were inaugurated the amount of prize money paid out was considerably less than last year.

One reason for this was that the turnip competition which was confined to certain counties, and for which large prizes were paid, started by private enterprise, and almost solely supported by private subscriptions, was discontinued as such and made province wide in its scope. It was also placed on the same basis as the other competitions regarding the payment of prizes.

A new element in the competitions this year was the Increased Farm Production Competition. This consisted of liberal prizes offered by the Halifax Board of Trade for farmers who made the greatest effort to meet the demand for greater production. For this purpose the province was divided into districts as follows: District No. 1, Annapolis, Kings, Lunenburg and Hants Counties; Dictrict No. 2, Digby, Yarmouth, Shelburne, Queens, Guysboro and Halifax Counties; District No. 3, Colchester, Cumberland, Pictou and Antigonish Counties; Dictrict No. 4, the four Cape Breton Counties. This grouping of counties was somewhat different from our previous arrangement for district competitions. As it was felt the above mentioned groups of counties made equitable districts and as it was desirable to have all of our district competitions based on similar groups of counties this arrangement was made applicable to all competitions.

The total amount of prize money paid was $1,425.14, divided as follows:

Wheat..........	$417.90	Potatoes........	$283.30
Oats............	530.10	Turnips.....:..	193.84

The number of entries were; wheat, 117, oats 154, potatoes, 195, turnips 49, total 415; an increase of 7 over last year

During this past year these competitions have been valuable as a means of distributing good seed, This year they are proving doubly valuable in this respect as in the central parts of the province there is very little grain fit for seed, while in the eastern end of the province the grain is of good quality.

Those who have been successful in these competitions have not only found a remunerative market for their products but have also been public benefactors.

While there may be a move to curtail agricultural expenditures we feel that it would be a mistake to interfere with the field crops competitions.

A detailed score of the various entries will be found on the following pages.

Respectfully submitted,

F. L. FULLER.

WHEAT.

ANNAPOLIS COUNTY.

Name	Address	Variety.
Name of Competitor	**Address**	**Variety.**
Chas. Foster	Clarence	Red Fife
Vernon Leonard	Clarence	Red Fife
Stuart Leonard	Clarence	Red Fife
E. J. Elliott	Clarence	Red Fife
T. E. Smith	Central Clarence	Marquis

ANTIGONISH COUNTY.

Thos. Hogan	Harbor Road	White Russian
John A. Cameron	Loch Katrine	Marquis
J. Cameron Chisholm	Salt Springs	White Russian
Thos. J. Grant	Antigonish	
Ronald Chisholm	Antigonish	White Russian
Ronald W. Chisholm	Glen Road	White Russian
James Dunn	Lr. South River	White Russian
John McGillvray	S.S. Cape George	White Russian
J. G. Taylor	Antigonish	Red Fife
Angus R. Boyd	Morristown	White Russian
Wm. McInnis	S.S. Cape George	White Russian
Alex. C. Chisholm	North Grant	Red Fife
D. J. Duggan	Antigonish	White Russian

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total.
5	10	5	25	10	20	20	5	100
4.75	9.	3.	24.	9.5	19.75	18.5	4.75	93.25
4.	9.	4.75	23.5	9.	18.5	16.	4.5	89.25
4.	8.5	5.	23.	8.75	18.	15.5	5.	87.75
3.	8.	5.	20.	9.	18.	15.	3.	83.
3.	6.	4.5	20.	8.	19.	10.	3.	73.5
4.75	9.	5.	22.	9.	20.	17.	5.	91.75
4.75	8.5	5.	23.	9.	19.	17.	5.	91.25
5.	7.5	5.	24.	9.5	18.	17.	5.	91.
4.75	8.	5.	23.	9.	19.	17.	5.	90.75
5.	8.	5.	21.	9.5	20.	17.	5.	90.5
4.5	9.	5.	23.	9.	17.	18.	4.75	90.25
4.5	8.5	4.75	21.	9.5	20.	17.	5.	90.25
5.	8.5	5.	22.	9.	18.	17.	5.	89.5
4.	9.	5.	22.	9.	19.	16.	5.	89.
4.75	9.	4.75	24.	8.5	16.	17.	5.	89.
5.	8.	4.5	23.	9.5	16.	17.	5.	88.
5.	7.	5.	22.	8.	20.	15.	5.	87.
4.5	7.	4.5	23.	8.	19.	15.	5.	86.

Alex. H. McPherson	Up. South River	White Russian

CAPE BRETON COUNTY.

John McMullen	George's River	Red Fife
A. W. Gillis	George's River	Red Fife
C. A. Munn	Leitches Creek	Red Fife
R. M. Jackson	Jacksonville	White Russian
E. J. Johnston	George's River	Red Fife
Dan J. Gillis	E. Bay Portage	Red Fife
Joseph Cash	Irish Cove	
Rev. J. W. McIsaac	East Bay	Red Fife
M. E. McNeil	Irish Cove	
Rod McLeod	Groves' Point	Red Fife
Murdock McLellan	Big Pond Centre	Red Fife

COLCHESTER COUNTY.

R. D. McKay	Balmoral Mills	Red Fife
Geo. W. McKay	The Falls	Red Fife
Hugh D. Campbell	Half Way Brook	Red Fife
J. L. Cunningham	Bay Head	White Russian
Harold B. Bowers	Great Village	White Russian

General appearance considering:— (1) Stand of crop	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality	(2) Uniformity of maturity.	Total
5.	8.5	5.	21.	9.5	15.	16.	4.75	84.75
4.	9.	4.	23.	9.	20.	17.	5.	91.
4.	8.	4.	22.	9.	20.	16.	5.	88.
4.5	9.	4.5	22.	8.	17.	16.5	4.	85.5
4.25	9.	5.	22.	8.	16	16	5.	85.25
4.	7.	5.	22.	9.	18.	15.	5.	85.
4.	9.	4.	24.	4.	19.	16.	5.	85.
4.	8.	4.	22.	9.	17.	17.	4.	85.
3.	7.	5.	24.	8.	16.	15.	5.	83.
4.	8.	4.	22.	8.	17.	15.	4.5	82.5
4.5	8.	1.	20.	8.	19.	17.	5.	82.5
4.	9.	5.	21.	8.	15.	16.	4.	82.
4.25	9.	4.5	23.5	9.25	18.75	18.5	4.5	92.25
4.5	9.25	4.25	23.	9.25	18.75	18.	4.25	91.25
4.5	8.5	4.5	23.25	9.	18.	18.	4.5	90.25
4.5	9.25	4.25	23.5	7.5	18.75	17.	4.5	89.25
4.5	9.25	4.5	22.25	9.	17.	18.	4.5	89.

J. R. Semple..........	Lower Truro.....	Red Fife........
H. Blair Cutten.......	Lower Truro.....	Red Fife........
John W. Murray......	Balmoral Mills...	Red Fife........

CUMBERLAND COUNTY.

L. W. McFarlane	Fox Har. Point...	Red Fife........
J. R. Harrison........	Maccan.........	White Russian...
C. C. McFarlane......	Fox Har. Point...	Red Fife........
L. Gordon Stevens.....	Bay Head.......	White Russian...
D. J. McIntosh.......	Stake Road......	Marquis ....
Tolbert McNutt.......	Wallace Grant...	Red Fife.........

GUYSBORO COUNTY.

Vincent McLean.......	New Town......	White Russian...
David Whidden.......	Glenelg.........	White Russian...
John O'Connell........	Guysboro Inter...	White Russian...
Isaac Fisher..........	Fisher's Mills....	Red Fife........
Wm. Grant...........	West Roachvale..	Marquis.........
Wm. G. Aikins........	Guysboro Inter...	White Russian...
John A. Sinclair.......	Goshen..........	White Russian...
Edward F. Sinclair....	Goshen..........	White Russian...

Generol appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality	(2) Uniformity of mtutity	Total.
4.5	7.5	4.5	22.75	9.	18.75	17.	4.5	88.5
4.75	9.	4.25	22.75	9.	16.5	17.	4.5	87.75
4.25	7.5	4.5	21.75	9.	18.5	17.	4.5	87.
4.	9.25	5.	24.	9.25	19.5	19.	4.5	94.5
4.	9.25	4.75	23.	10.	19.	19.25	5.	94.25
4.75	9.25	4.	23.	9.	20.	19.	4.	93.
4.25	9.5	4.	23.25	9.	19.25	18.75	4.5	92.25
5.	9.5	4.5	22.5	9.	18.	19.	4.25	91.75
4.5	9.	4.75	23.	9.	18.	19.	4.	91.25
4.5	9.5	5.	24.	9.5	19.	18.	5.	94.5
4.5	8.75	5.	24.	9.5	19.5	17.75	5.	94.
4.5	8.5	5.	24.5	9.5	19.	17.75	5.	93.75
4.5	9.	5.	24.5	9.	19.5	17.	4.5	93.
4.5	9.	5.	24.5	8.5	18.	17.5	5.	92.
4.	9.	4.	24.5	10.	18.	17.	5.	91.5
4.5	8.5	5.	24.	9.5	18.5	17.	4.	91.
4.	9.5	4.5	24.	9.	18.	17.	4.	90.

Joseph Lawlor	West Erinville	White Russian
Wm. A. Aikins	Guysboro Inter.	White Russian
A. D. Archibald	Glenelg	Red Fife
Andrew McKinnon	Argyle	White Russian
John A. McNeil	S. River Lake	Marquis
Frank Forbes	Goshen	Marquis
A. F. McNaughton	Goshen	White Russian
Gordon Stewart	S. River Lake	White Russian

HALIFAX COUNTY.

A. Archibald & Son	M Musquodoboit	White Russian
George Burris & Son	U Musquodoboit	Marquis
John Ogilvie	Elderbank	Red Fife
Aubrey Archibald	M Musquodoboit	White Russian
P. G. Archibald & Son	M Musquodoboit	White Russian
Samuel Archibald	Stewarts	White Russian
Ed. T. D. Snow	M Musquodoboit	White Russian
Mitchell Bros	M Musquodoboit	White Russian
E, McL. Benvie	M Musquodoboit	White Russian

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total
4	9.	4.	23.	8.	18.75	18.	4.	88.75
4.5	9.	4.5	22.	8.	17.	18.	5.	88.
4.5	9.	3.5	24.	8.	17.	17.5	4.	87.5
4.	4.8	4.	24.	6.	19.5	17.	4.5	87.
3.5	7.5	4	22.	9.	19.	16.	5.	86.
4.5	7.5	4.	22.75	8.	17.	17.	5.	85.75
4.	8.	5	23.	8.5	18.	15.	4.	85.5
3.5	8.	3.5	23.	9.	17.	17.	4.	85.
4.5	9.5	4.5	23	9.	18.5	18.5	5.	92.5
4.	9.5	5	24.	9.75	17.5	17.	5.	91.75
4.5	9.5	5.	24.5	6.	19.5	18.	4.	91.
4	9.5	5	24.	9.	17.	17.	4.5	90.
4.5	8.75	4.	23.5	9.	18.	17.	4.5	89.25
4.	9.	4.5	22.	9.5	16.5	18.	4.5	88.
4.5	9.	2	24.	9.5	19.	15.	4.5	87.5
4.	9.	3	22.	8.5	18.	18.5	4.	87.
3.5	8.	4.5	24.	9.	18.	15.	4.5	86.5

INVERNESS COUNTY.

J. Archie McDonnell...	Judique Intervale	Red Fife........
John A. Burton........	N. E. Margaree..	White Russian...
David Dunn...........	Emerald.........	Red Fife........
John A. Campbell......	Glenora Falls....	
A. Scott McDonnell....	Port Hood	White Fife.......
D. D. McDonald.......	Glendale........	White Russian...
H. A. McPherson......	Mabou..........	White Russian...
L. J. LeBlanc	Belle Cote.......	Red Fife........
Alex. Cameron	Beatonville......	Marquis ....
Wm. Sutherland.......	Little Mabou....	Red Fife........
Eddy B. Smith........	Black Stone......	White Russian...
Alex. Rankin..........	Judique.........	Red Fife........
M. McKinnon.........	W. Bay Centre ..	Red Fife........
Alex. D. Campbell.....	Beatonville......	Red Fife.........
A. J. Campbell.........	Beatonville......	White Russian...
Jas. A. Murphy........	N. E. Margaree..	Red. Fife........
F. A. McKillop........	S. W. Mabou....	White Russian...
Jas. A. Beaton.........	Beatonville......	White Russian...

PICTOU COUNTY.

R. D. Ross............	Bay View........	White Russian...

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total.
5.	10.	4.	22.5	8.5	19.5	19.	4.75	93.25
5.	9.5	5.	23.5	9.5	18.5	16.	5.	92.
4.	8.5	4.	23.	8.5	20.	18.	5.	91.
4.25	9.25	5.	22.	8.	17.	19.	4.5	89.
4.5	9.25	4.5	20.	8.5	18	18.5	5.	88.25
5.	8.5	4.5	22.	9.	16.	18.	4.75	87.75
4.75	8.	5.	23.5	9.25	16.	15.	4.5	86.
3.75	8.75	4.5	20.	8.5	19.	17.	4.	85.5
4.	8.5	4.	20.	8.5	18.	16.	4.	83.
4.	8.5	4.5	19.	9.5	17.	16.	4.5	83.
4.75	9.	4.5	16.	9.5	16.	18.5	4.5	82.75
4.5	8.5	5.	20.	9.	15.	16.	4.5	82.5
4.5	9.	4.25	22.	5.	15.	17.	4.5	81.25
4.	7.	4.25	21.	8.	16.	16.	4.5	80.75
3.	7.	5.	22.	9.	15.	15.	4.5	80.5
3.5	8.	4.	20.	8.5	15.	16.	5.	80.
2.5	7.	4.75	23.	8.	14.	15.	5.	79.25
2.5	6.	4.	20.	7.	18.	15.	4.	76.5
4.5	9.25	5.	24.5	9.	20.	17.5	5.	94.75

A. D. McKay	Pictou	White Russian
H. A. Tattrie	River John	Red Fife
J. McMilligan & Sons	Roys' Island	Marquis
Robert Murray	Marshville	Red Fife
Calvin Langille	Marshville	Red Fife
J. W. Hatch	Alma, R. R. 1	Red Fife
W. O. Creighton	W. River Station	Red Fife

RICHMOND COUNTY.

John J. Johnston	Red Islands	Red Fife
Rev. R. L. McDonald	St. Peters	Red Fife
Benjamin McKenzie	St. Georges Ch.	White Russian
Alex. G. McKay	Grand River	Red Fife
Stephen McKenzie	Hay Cove	Red Fife
Alex. H. McKay	St. Georges Ch.	White Russian
Bertram McPherson	Grand Anse	
Peter Sutherland	Soldier's Cove	Red Fife
Dougald Campbell	Soldier's Cove	Red Fife
John J. McDonald	Arichat	Red Fife
Reynolds Smith	Arichat	Red Fife
Murdock McInnis	St. Georges Ch.	Red Fife

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total.
4.75	9.5	4.5	24.	8.	20.	18.	4.5	93.25
4.5	9.	5.	23.	9.5	19.75	17.	5.	92.75
4.5	9.	4.5	24.	9.	18.	18.5	4.75	92.25
4.25	9.5	5.	22.	9.5	19.5	17.	4.75	91.5
4.75	9.	4.5	22.	10.	19.	17.	4.5	90.75
4.5	9.5	5.	23.	8.	15.	18.	5.	88.
4.5	9.	4.5	21.	9.25	15.	17.	4.75	85.
5.	9.75	5.	23.	9.75	20.	17.	5.	94.5
5.	9.75	4.75	23.	9.75	20.	17.	5.	94.25
5.	10.	5.	23.	9.	19.5	17.	5.	93.5
4.75	9.	5.	23.	7.	19.5	17.	4.75	90.
4.	9.	5.	22.	8.5	19.	16.5	5.	89.
4.5	8.5	5.	22.	9.5	17.	16.5	5.	88.
4.75	9.5	4.75	21.	9.75	14.	16.	5.	84.75
4.5	9.	4.	21.	8.5	14.	15.	4.5	80.5
3.5	7.5	3.5	22.	6.5	18.	15.	4.5	80.5
3.	6.5	5.	21.5	6.5	17.	15.	5.	79.5
4.5	8.5	5.	21.	5.5	14.	15.	5.	78.5
3.	7.	5.	19.	8.5	16.	15.	5.	78.5

Wm. H. Ross	St. Georges Ch.	White Russian
Peter J. McKenzie	Soldier's Cove	Red Fife
Martin Gillis	Soldier's Cove	Red Fife
Hugh Murray	Points W. Bay	White Russian

VICTORIA COUNTY.

Abner Crowdis	Baddeck Bridge	Marquis
Colin Nicholson	Baddeck Bridge	Red Fife
H. G. Matheson	Hunter's Mount	Red Fife
Everett Rice	Baddeck Forks	Red Fife
Farquhar Buchanan	Baddeck Forks	Red Fife

OATS.

ANNAPOLIS COUNTY.

Name of Competitor	Address	Variety.
T. E. Smith	Central Clarence	Banner
Stuart Leonard	Clarence	Banner
Chas. Foster	Clarence	Ligowa
Vernon Leonard	Clarence	Banner
E. J. Elliott	Clarence	Banner

ANTIGONISH COUNTY

J. G. Taylor	Antigonish	Banner

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good qualit—	(2) Uniformity of maturity.	Total.
3.	7.	5.	19.	15.	8.5	16.	5.	78.5
3.5	7.5	2.5	21.	8.	15.	15.5	5	78.
2.5	6.5	5.	21.	8.5	15.	14.	5.	77.5
3.5	6.5	5.	19.	9.5	14.	15.	5.	77.5
4.75	9.5	4.5	21.	9.5	17.	17.5	5.	88.75
4.25	8.5	4.75	24.	9.	16.	17.	5.	88.5
4.5	8.5	4.75	21.	9.5	16.	15.	4.5	83.75
4.5	9.	4.5	20.	8.	16.	17.	4.5	83.5
4.5	6.5	5.	23.	8.	15.	12.	4.5	77.5
4.25	8.75	4.5	23.	8.5	18.5	17.	4.75	89.25
4.	8.	4.5	24.5	8.5	19.	16.	4.25	88.75
4.	8.5	4.5	23.	8.	18.5	16.	4.25	86.75
4.	8.	5.	22.	8.5	18.	15.5	4.5	85.5
3.	7.	4.5	24.	9.5	19.	14.	4.5	85.5
5.	9.	4.75	24.	8.5	20.	17.	5.	93.25

John A. McDonald.....	Maryvale........	Banner..........
Thos. J. Grant.........	Antigonish.......	Banner..........
Ronald W. Chisholm...	Antigonish.......	Banner ....
Ronald Chisholm.......	Antigonish.......	Banner..........
James Dunn	Lr. South River..	Banner..........
Alex. C. Chisholm	North Grant.....	Banner ....
Thos. Hogan..........	Harbor Road....	Banner ....
J. M. McEachern......	S.S. Cape George	Siberian.........
C. F. Ross............	Maryvale........	Banner ....
Allan McDonald.......	St. Andrews.....	Banner ....
A. J. McGillvray.......	Dunmaglass.....	Thous. Dollars...
Alex. J. Chisholm......	West River......	Banner ....
D. J. Duggan	Antigonish.......	Banner ....
John C. Chisholm......	Lr. South River..	Banner ....
J. Cameron Chisholm...	Salt Springs......	Banner ....
John A. Cameron......	Loch Katrine....	New Market.....
John McGillvray	S.S. Cape George	Banner ....

CAPE BRETON COUNTY.

John McQueen........	Leitches Creek...	Banner ....
A. D. Morrison........	Big Pond........	Banner ....

General appearance considering :— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total
5.	8.5	4.75	24.	9.	20.	17.	4.75	93.
5.	8.	5.	24.	9.5	18.	18.	5.	92.5
4.75	8.	4.75	23.	9.25	20.	17.	5.	91.75
5.	8.5	4.75	22.	9.5	20.	17.	5.	91.75
5.	9.	4.	23.	9.75	20.	16.	4.5	91.25
4.75	8.	4.	24.	9.5	20.	16.	4.75	91.
5.	7.5	5.	23.	9.	20.	16.	5.	90.5
4.5	8.	5.	25.	8.	20.	15.	5.	90.5
4.75	8.	4.5	23.	9.	20.	16.	4.75	90.
4.75	8.	4.5	23.	9.5	19.	16.	5.	89.75
5.	7.5	5.	22.5	10.	20.	15.	4.5	89.5
4.5	8.5	5.	22.	9.5	19.	16.	4.5	89.
4.75	7.5	5.	22.00	9.	20.	15.	5.	88.25
4.	7.5	5.	24.	9.5	20.	13.	5.	88.
5.	7.	5.	24.	9.	18.	15.	5.	88.
4.75	8.	4.75	24.	9.	18.	13.	5.	86.5
5.	8.	4.35	23.	8.5	15.	17.	4.75	85.5
4.75	9.5	4.	23.	9.5	20.	18.5	4.5	93.75
4.	8.	4.75	23.	10.	20.	17.	5.	9.75

John Barrington.......	North Sydney....	Banner..........
John McMullen	George's River...	Banner ....
Dan J. Gillis...........	E. Bay Portage...	Banner ....
A. A. McNeil..........	Big Pond........	Old Island Black.
Joseph Campbell.......	B. Pond Centre..	Old Island Black.

COLCHESTER COUNTY.

John W. Murray.......	Balmoral Mills...	Banner ....
R. D. McKay.........	Balmoral Mills...	Banner..........
Hugh D. Campbell.....	Half Way Brook	Banner ....
James R. Hogan.......	Denmark........	Banner..........
George Retson.........	Brookside R.R.2..	White Wave.....
Harold B. Bowers......	Great Village....	Banner ....
J. L. Cunningham	Bay Head.......	Banner..........
Wilmot L. Fulton......	Stewiacke.......	Banner ....
George Sillery.........	Valley...........	Early Blossom...
J. R. Semple...........	Truro...........	Banner ....
H. Blair Cutten	Lower Truro.....	Banner ....

CUMBERLAND COUNTY.

W. L. McFarlane......	Fox Har. Point...	Banner ....
C. C. McFarlane.......	Fox. Har. Point..	Banner ....

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total.
4.75	9.	4.	22.	9.5	19.	17.	5.	90.25
4.	7.	3.	24.	9.5	20.	15.	4.	86.5
3.	7.	3.	22.	9.5	20.	16.	4.5	85.
3.	7.	4.	24.	9.5	18.	15.	4.	84.5
3.	7.	4.	22.	9.5	19.	15.	4.	83.5
4.5	9.25	4.5	23.5	9.25	18.75	18.5	4.5	92.75
4.15	9.25	4.5	23.25	9.25	18.75	18.	4.5	91.75
4.5	9.	4.25	23.25	8.5	18.	18.5	4.5	90.5
4.75	9.	4.5	23.25	9.	17.5	18.	4.5	90.5
4.5	9.25	4.5	22.25	9.25	18.	17.5	4.	89.25
4.5	9.	4.5	22.75	9.	17.	18.	4.5	89.25
4.5	9.	4.5	23.5	8.	18.75	16.5	4.25	89.
4.5	9.	4.25	21.25	9.	18.	18.5	4.25	88.75
4.25	8.5	4.25	21.75	9.25	18.	18.	4.5	88.5
4.5	7.5	4.5	22.75	8.5	18.75	16.5	4.	87.
4.75	8.5	3.75	22.75	9.	16.	17.	4.5	86.25
4.5	9.5	5.	24.	9.	20.	19.	5.	96.
4.5	9.	4.25	23.5	9.5	19.	18.5	4.	92.25

Herbert Atkinson......	Maccan.........	Banner.......
J. R. Harrison.........	Maccan.........	Banner.........
D. J. McIntosh........	Stake Road......	Early Yield......

GUYSBORO COUNTY.

J. J. McNeil...........	Giant's Lake	Banner ....
Frank Forbes..........	Goshen..........	Tartar King.....
John A. Chisholm.....	Salmon River....	Tartar King.....
D. N. Cameron........	New Town......	Tartar King.....
Isaac Fisher...........	Fisher's Mills....	Tartar King.....
Robert Croft..........	Goshen..........	Banner ....
Alex. T. McBain.......	New Town......	Banner..........
John A. McNeil........	S. River Lake....	Banner..........
Ronald McIsaac.......	Giant's Lake	Banner..........
John A Sinclair........	Goshen..........	Banner..........
Angus D. McDonald...	Giant's Lake	Banner ....
Edward F. Sinclair.....	Goshen..........	Banner..........
W. Sutherland.........	Denver..........	Banner..........
Arthur Sinclair........	Goshen..........	Banner ....
A. F. McNaughton.....	Goshen..........	Banner..........

General appearance considering:— (1) Stand of crop	(2) Type of plant. vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality	(2) Uniformity of maturity.	Total
4.	9.5	4.	22.	9.	19.5	19.	4.5	91.5
4.	8.	4.5	23.5	9.	19.	18.5	4.25	90.75
4.	8.	4.	24.	8.25	19.5	18.25	4.5	90.5
4.5	9.	5.	24.	9.5	17.	18.75	4.5	92.25
4.5	8.	5.	24.5	9.	19.5	17.5	4.	92.
4.5	9.	5.	23.5	9.5	19.	17.	4.	91.5
4.5	8.	5.	25.	8.5	18.75	16.75	4.	90.5
4.5	8.	5.	23.5	8.5	19.	17.	4.5	90.
4.5	9.	4.5	24.5	10.	16.	16.5	4.	89.
4.5	9.	3.5	24.5	8.	18.75	16.	4.	88.25
4.5	9.	4.	23.5	9.	17.5	16.5	4.	88.
4.	8.	4.5	24.	8.5	18.	16.	4.5	78.5
3.5	8.	4.	23.	10.	18.	16.	4.	86.5
3.	8.	4.	24.	9.5	18.75	15.	4.	86.25
3.	8.	4.5	23.5	9.	19.	15.	4.	86.
3.5	8.	3.	24.	9.5	18.75	15.	4.	85.75
3.5	8.	3.5	24.5	9.	18.	15.	3.5	85.
3.	7.	3.	24.5	9.5	19.	14.	4.	84.

Henry Sinclair	Goshen	Banner
Gordon Stewart	South R. Lake	Tartar King

HALIFAX COUNTY.

A. Archibald & Son	M Musquodoboit	Banner
Aubrey Archibald	M Musquodoboit	Banner
Ernest Redmond	Dean	Banner
John Ogilvie	Elderbank	Banner
P. G. Archibald & Son	U Musquodoboit	Banner
C. D. Joudrey	M Musquodoboit	Banner
G. Burris & Son	U Musquodoboit	Banner
E. McL. Benvie	M Musquodoboit	Banner

INVERNESS COUNTY.

A. J. Campbell	Beatonville	Early Yielder
J. Archie McDonnell	Judique Intervale	Banner
B. F. Smith	Glendyer	Early Yielder
A. Scott McDonnell	Port Hood	Banner
H. A. McPherson	Mabou	Granary Filler
James J. Miller	N. E. Margaree	Banner

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total.
2.5	7.	4.	24.5	9.5	19.	14.	3.5	84.
4.	8.	4.	24.	7.	16.	15.	4.	82.
4.5	9.5	4.5	24.	9.5	17.	18.5	4.5	92.
4.	8.25	4.5	24.	9.5	19.	17.5	4.5	91.25
4.	9.	4.5	24.	9.5	19.	17.	4.	91.
4.	7.5	5.	24.5	9.	19.5	16.	4.5	90.
4.	9.	4.5	23.5	9.	18.	17.	4.5	89.5
3.5	8.	4.5	25.	9.5	19.75	15.	4.	89.25
3.	8.	4.5	25.	9.5	18.	16.	5.	89.
4.	8.	3.	24.	9.5	18.	17.	4.5	88.
5.	9.5	4.75	23.	9.	20.	18.	4.	93.25
4.75	9.5	5.	23.	6.	20.	18.5	5.	91.75
4.5	9.	4.5	23.	8.5	18.5	18.	4.25	90.25
4.25	9.	4.25	20.	9.5	19.5	18.5	4.75	89.75
5.	9.	5.	22.	8.	20.	17.	3.5	89.5
4.75	8.5	4.5	23.	6.	20.	18.5	3.5	88.75

Alex. T. Beaton	Brook Village....	Banner..........
Robert A. McLean.....	Orangedale......	Yellow Russian...
Alex. D. Beaton........	Little Judique....	Banner..........
Angus A. McDonald....	S. W. Mabou....	Banner ....
Murdock Campbell	Centreville.......	Wide Awake.....
Angus McPherson	Rear Port Hood..	Granary Filler...
F. A. McKillop........	S. W. Mabou....	Banner..........
Jas. P. Tompkins......	Emerald.........	Banner..........
Jas. A. Beaton.........	Beatonville......	Kempt..........
James M. Murphy.....	N. E. Margaree..	Banner ....
John A. Nicholson......	Mabou..........	Banner..........
M. McKinnon.........	W. Bay Centre ..	Banner..........
Jas. B. McLeod........	West Bay.......	Banner..........
Angus McLean........	North Ainslie....	Banner..........
Peter P. Coody........	N. E. Margaree..	Banner..........
John A. Campbell......	Glenora Falls....	Banner..........
J. J. McLellan.........	Glenville........	Banner..........
D. A. McLochlin	West Bay Centre	Banner..........
Hugh A. McLochlin....	West Bay Centre	Banner..........

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total
5.	9.5	3.5	19.	9.	19.	18.	5.	88.
4.	8.5	3.5	21.	9.5	20.	17.	4.25	87.75
4.	7.5	5.	24.5	8.5	19.	15.	3.5	87.
5.	9.5	4.5	21.	8.5	16.	18.	4.25	86.75
4.5	8.5	3.5	22.	8.	19.	17.	4.	86.5
5.	8.	4.5	20.	8.	20.	17.	4.	86.5
3.	7.	5.	23.5	8.5	18.	17.	3.5	85.5
4.5	7.5	3.5	23.5	7.	20.	16.	3.5	85.5
4.5	7.	4.25	24.	7.	20.	15.	3.5	85.25
4.5	7.5	4.	24.	8.	17.	16.	4.	85.
4.5	8.	4.5	23.	9.25	15.	17.	3.5	84.75
4.5	7.5	4.	23.	7.5	18.	16.	4.5	84.5
4.25	9.	4.	20.	8.5	16.	18.	4.5	84.25
4.75	9.	4.5	23.	8.	15.	16.	4.	84.25
3.5	8.	3.	24.	10.	16.	16.	3.	83.5
3.5	7.5	4.	19.	9.5	18.	17.	4.	82.5
4.5	9.5	3.5	20.	6.	18.	17.	4.	82.5
4.5	7.5	3.5	21.	7.	18.	16.	4.	81.5
4.25	8.5	3.5	22.	6.	17.	16.	4.	81.25

Alex. Rankin..........	Judique.........	Black Tattarian..
D. D. McDonald........	Glendale........	Banner..........
John H. Smith	Hillsboro........	Banner..........
Michael J. Tompkins...	East Margaree...	White Wave.....
John A. Burton........	N. E. Margaree..	Banner ....
Angus McPhee.........	Little Mabou....	Banner ....
Wm. McLean..........	North Ainslie....	Early Yielder....
J. Tompkins	N. E. Margaree..	Banner..........
J. D. McGregor........	North Ainslie....	Old Island Black.

LUNENBURG COUNTY.

Henry Newcombe......	Newcombeville...	Banner..........
James. Mader.........	Bridgewater.....	Banner..........
Mark Rhodenizer......	W. Northfield ...	Banner..........
A. W. Hebb...........	Bridgewater.....	Banner ....
Abner Webber........	Chester.........	Banner..........
Joseph McKay.........	U. Northfield....	Banner..........
Archibald Penny.......	U. Northfield....	Banner..........
Aseph Newcombe......	Newcombeville...	Tartar King.....

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality	(2) Uniformity of mtutity	Total.
3.5	8.	4.	18.	8.5	18.	17.	4.	81.
4.	7.5	4.5	23.	6.5	16.	16.	3.5	81.
2.5	6.	4.75	23.	10.	6.1	15.	3.5	80.76
4.5	8.	3.5	24.	6.	14.	17.	3.	80.
4.75	7.	4.	20.	8.5	16.	15.	4.5	79.75
4.	7.	4.	20.	8.5	16.	16.	4.	70.5
4.5	9.	4.	17.	8.	15.	18.	4.	79.5
4.75	8.5	4.	12.	7.	16.	18.	3.5	73.75
4.	6.	4.	12.	8.	15.	18.	4.	71.
5.	9.	3.	23.5	8.	19.5	18.	5.	92.
4.	7.	4.	24.	9.	19.	16.	4.	87.
5.	8.5	4.	22.	6.	19.	15.	3.5	83.
4.	7.	4.	21.	6.	19.	15.	4.	80.
5.	7.	4.	22.	8.	14.	14.	4.	78.
3.	8.	2.	22.	6.	15.	14.	4.	74.
3.	7.	2.	20.	7.	15.	15.	4.	73.
4.	7.	5.	23.	7.	5.	17.	5.	73.

PICTOU COUNTY.

H. M. Tattrie	River John	O. A. C.
Robert Murray	Marshville	Banner
J. Milligan & Son	Roy's Island	Banner
W. O. Creighton	W. River Station.	
A. D. Ross	Bay View	Banner
R. A. McKenzie	Westville	Abundance

RICHMOND COUNTY.

Allan D. McCuish	Lochside	Banner
Wm. Kempt	L'Archeveque	Kempt
W. A. Urquhart	West Bay	Banner
John J. McDonald	Soldier's Cove	Banner
J. J. Johnston	Red Islands	Banner
Geo. J. Matheson	L'Archeveque	Banner
Dan A. Matheson	L'Archeveque	Kempt
Alex. G. McKay	Grand River	Kempt
Alex. Matheson	St. Esprit	Kempt
John M. McInnis	West Bay	Banner
John W. Sutherland	Soldier's Cove	Banner

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and othe kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total.
4.	9.	5.	24.	9.5	19.75	19.	5.	95.25
4.5	8.5	4.75	22.	8.	19.5	18.5	5.	90.75
4.	6.	2.	24.5	8.	20.	15.	5.	84.5
3.	7.	4.5	20.	7.	19.5	15.	5.	81.
4.5	9.	4.25	24.5	5.	20.	15.	5.	77.25
No Score								
4.75	9.75	4.75	23.	9.75	20.	17.	5.	94.
4.75	9.5	4.5	23.	9.75	20.	17.	5.	93.5
5.	9.25	.5	23.5	9.75	19.	17.	5.	93.5
4.75	9.5	5.	22.5	7.5	20.	16.5	5.	90.75
4.75	9.5	5.	22.5	8.75	18.	17.	5.	92.5
4.75	9.5	5.	20.	9.75	18.5	17.	5.	89.5
4.25	9.	4.	22.	9.	19.5	16.5	5.	89.25
4.5	9.25	4.	22.	9.	18.5	17.	4.75	89.
4.25	8.25	5.	23.	9.	17.5	16.	5.	88.
4.25	8.5	4.5	21.	7.5	19.5	16.5	5.	86.75
4.5	8.5	5.	22.	8.	17.5	15.5	5.	86.

Stephen McKenzie.....	Hay Cove.......	Island Black.....
R. M. Morrison........	K. Loch Lomond.	Banner..........
Dan N. McLeod.......	Grand River.....	White Wave.....
Murdock A. McLeod...	L. Lomond West.	Banner..........
Michael McDonald.....	Soldier's Cove....	Banner..........
Joseph Cash...........	Irish Cove.......	Banner..........
Joseph Gillis...........	Soldier's Cove....	Island Black.....
Martin Gillis..........	Soldier's Cove....	Island Black.....
Peter Sutherland.......	Soldier's Cove....	Banner..........
John L. McAulay......	Grand River.....	Banner..........
Duncan McKillop......	Cleveland.......	Banner..........

VICTORIA COUNTY.

H. G. Matheson.......	Hunter's Mount..	Tartarian........
Murdock McLeod......	Baddeck Bridge..	O.A.C. 72.......
Colin Nicholson	Baddeck Bridge..	
Everett Rice...........	Baddeck Forks...	Banner..........
F. A. McRae..........	Baddeck Bridge..	
W. W. Sutherland......	Hunter's Mount..	Banner..........
Farland McFarlane.....	Baddeck.........	

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good qualit—	(2) Uniformity of maturity.	Total.
4.5	8.5	4.	20.	9.	18.5	16.	5.	85.5
4.5	9.5	3.5	21.5	9.5	16.	15.5	4.75	84.75
3.5	7.5	4.75	22.	9.5	16.25	16.5	4.5	84.5
3.5	7.5	5.	21.5	9.5	17.	16.	4.5	84.5
3.5	7.5	4.	23.	9.5	15.5	15.5	5.	83.5
3.25	6.5	5.	21.	7.5	19.5	15.75	5.	83.5
3.25	8.5	3.25	22.	7.25	19.	15.	4.75	83.
3.25	8.5	3.25	22.	7.25	19.	15.	4.75	83.
3.25	7.25	4.25	22.	7.25	19.	15.	4.75	82.75
3.25	7.75	3.	20.	9.	19.	15.	4.75	81.75
3.5	6.5	4.75	22.	8.5	15.	15.	4.75	80.
4.	9.5	4.75	24.	9.	19.	17.	4.75	92.
3.5	9.	4.	23.	9.75	20.	17.	4.	90.25
3.5	7.5	4.75	24.	9.75	16.	15.	4.	84.5
3.	7.	4.5	22.	9.	19.	16.	4.	84.5
3.5	7.	4.75	22.	9.75	18.	15.	4.	84.
3.5	7.5	4.25	24.	8.	17.	15.	4.	83.25
4.75	7.	4.	25.	6.	18.	12.	4.	80.75

YARMOUTH COUNTY.

Clifford R. Cann	Chegoggin	Banner
A. C. Servant	Overton	Banner
Murray Crosby	Chegoggin	Banner
F. J. Churchill	Overton	Banner
S. A. Cook	Cen. Chebogue	Banner
Gordon T. Lewis	Yarmouth	Banner
John C. Corning	Chegoggin	Banner

General appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding, absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight, and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality.	(2) Uniformity of maturity.	Total.
4.75	9.25	5.	24.	9.	19.	19.	5.	95.
4.	9.	4.	24.	9.	19.5	19.	5.	93.5
4.	8.	4.5	24.	9.5	19.	18.75	5.	92.75
4..	9.	4.	22.	9.	19.	18.	4.25	89.25
4.	8.75	4.	22.	9.25	18.	17.25	4.75	88.
3.75	9.	4.	20.	9.25	18.	18.	5.	87.
4.5	8.	4.75	19.25	7.5	18.	19.5	4.75	86.25

POTATOES.

District No. 1, Digby, Yarmouth, Shelburne, Queens, Halifax and Guysboro.

A. D. Burris..........	U Musquodoboit.	Clark's No. 1....
C. D. Joudrey.........	M Musquodoboit	Kidney..........
R. A. McLean.........	New Town......	Island Blues.....
Clifford Cann..........	Chegoggin.......	Gold Coin.......
John Ogilvie	Elderbank.......	Clark's No. 1....
J. Frank Forbes........	Goshen..........	Island Blues.....
Ernest Redmond......	Dean...........	Carmans........
A. Archibald & Son....	M Musquodoboit	Carmans........
Murray Crosby........	Chegoggin.......	Gold Coin.......
F. J. Churchill.........	Overton.........	Carly Norwood...
Aubrey Archibald.....	M Musquodoboit	Carman.........
E. McL. Benvie........	U Musquodoboit.	Clark's No. 1....
Mitchell Bros..........	M Musquodoboit	Irish Cobblers....
J. J. McNeil...........	Giant's Lake.....	Carmans........
Robert Croft..........	Goshen..........	Island Blues.....
A. C. Servant..........	Chegoggin.......	Gold Coin.......
C. D. Fuller...........	Arcadia.........	Gold Coin.......
Gordon Lewis..........	Yarmouth.......	Gold Coin.......
Samuel Archibald......	U Musquodoboit.	Carman.........
George S. Dickey......	M Musquodoboit	Joudrey's Pride...

General appearance considering:— (1) Method of planting, stand of crop	(2) Vigor of growth, acreage, etc.	Freedom from blight, scabs and insects.	Method of thoroughness of cultivation.	Purity of variety.	Apparent yield considering:— (1) Number and weight of marketable potatoes per hill.	(2) Quality, color, shape and smoothness.	(3) State and uniformity of maturity, and freedom from sunburn.	Total.
7	8	20	20	10	15	10	10	100
7.	8.	19.5	20.	10.	14.	8.	10.	96.5
7.	8.	19.5	20.	10.	13.	9.	9.5	96.
7.	8.	18.5	20.	8.5	14.	8.	9.5	93.5
6.5	7.5	17.5	17.5	10.	13.5	9.5	8.5	90.5
6.5	7.5	19.5	19.	9.	12.5	7.	9.	90.
6.	7.5	18.5	18.	9.5	13.	8.	9.	89.5
6.	7.5	19.	19.5	9.	12.	8.	8.	89.
6.	7.	19.	16.5	10.	12.	8.	10.	88.5
6.	7.5	19.5	16.	10.	12.	8.	9.	88.
5.5	7.5	18.	15.5	9.5	14.	9.	8.5	87.5
6.	7.	18.5	17.	10.	12.5	7.	9.	87.
6.	7.5	19.	18.	9.	12.	6.	9.	86.5
6.	7.5	16.	18.	10.	12.	7.	9.5	86.
6.	7.	19.5	15.	9.	11.	8.	9.5	85.
4.	7.	19.	16.	8.	13.5	7.	10.	84.5
5.	6.5	17.	15.	9.5	12.	8.5	9.5	83.
5.	6.5	14.	16.	10.	13.	8.5	9.	82.
5.	6.	17.5	16.	9.	11.	8.	9.	81.5
6.	7.	15.	16.	9.	11.	8.	9.	81.
5.	7.	17.	18.	9.	11.	5.	8.	80.

District No. 2, Annapolis, Kings, Lunenburg and Hants Counties.

Albert C. Veniotte....	West Northfield..	Carman.........
Aseph Newcombe......	Newcombeville...	Mills Pride......
James Mader..........	Pine Grove......	Mills Pride......
A. W. Hebb...........	Bridgewater.....	Carman.........
Annand F. Hebb.......	Hebbville........	Mills Pride......
Wm. Olie.............	Selmah..........	Green Mountain..
Joseph McKay.........	U. Northfield....	Rural Blush.....
Henry Newcombe......	Newcombeville...	Mills Pride......
Wallace Rhodenizer....	Bridgewater.....	Green Mountain..
H. L. Neily............	Kingston........	Early Reilly.....
E. Karakule Sheep Co..	Windsor.........	Dakota Red.....
Archibald Penny.......	U. Northfield....	Rural Blush.....
L. Schmidt............	Maitland........	Garnet Chili.....

District No. 3, Colchester, Cumberland, Pictou and Antigonish Counties.

Joseph Milligan........	Roy's Island.....	Green Mountain..
Cameron Chisholm.....	Salt Springs......	Rose Bud.'.......
Calvin Langille.........	Marshville.......	Carman.........
R. D. Ross............	Bay View........	Green Mountain..
J. R. Harrison.........	Maccan.........	Carman.........

General appearance considering:— (1) Method of planting, stand of crop.	(2) Vigor of growth, acreage ,etc.	Freedom from blight, scabs and insects.	Method of thoroughness of cultivation.	Purity of variety.	Apparent yield considering:— (1) Number and weight of marketable potatoes per hill.	(2) Quality, color, shape and smoothness.	(3) State and uniformity of maturity, and freedom from sunburn.	Total.
6.75	8.	19.5	20.	10.	12.	9.5	8.5	94.25
7.	8.	17.	19.5	10.	13.	9.	10.	93.5
6.5	8.	19.	20.	10.	12.	9.	8.5.	93.
6.75	8.	17.	19.	10.	12.	9.5	10.	92.25
7.	7.25	17.5	18.5	10.	12.5	9.5	9.	91.25
7.	7.5	18.	19.	10.	11.	8.	10.	90.5
6.75	7.75	17.	19.	10.	11.	9.5	9.	90.
7.	7.	16.	19.	10.	12.	8.5	9.5	89.
6.5	7.5	16.	18.	10.	11.	9.5	9.5	88.
7.	7.5	16.	17.	10.	10.	9.5	9.5	86.5
6.75	7.	17.	19.	9.	10.	8.	9.5	86.25
6.25	7.	16.	16.	10.	7.	9.5	8.5	80.25
6.	3.	18.	10.	10.	7.	8.	5.	67.
7.	8.	19.5	20.	9.5	14.5	10.	9.	97.5
6.	7.5	19.	19.5	10.	14.	10	9.	95.
6.	7.	20.	20.	10.	13.25	9.	9.	94.25
7.	8.	19.	20.	9.	12.	9.	10.	94.
6.75	7.5	19.	20.	10.	11.	9.5	10.	93.75

James Thompson.......	Cloverdale.......	Carman.........
H. M. Tattrie..........	River John.......	Green Mountain..
H. D. Campbell........	Half Way Brook..	Clark's No. 1.....
Alex. C. Chisholm......	North Grant.....	Carman.........
G. W. Taylor..........	Antigonish.......	Green Mountain..
Blair Cutten...........	Lower Truro.....	Clark's No. 1.....
Ronald W. Chisholm....	Glen Road.......	Green Mountain..
W. L. McFarlane.......	Fox Har, Point...	
Wm. McKenzie........	Green Hill.......	Calico...........
D. J. McIntosh.........	Stake Road......	Irish Cobbler.....
Geo. Retson...........	Brookside.......	Dakota Red......
Alex. Bezanson.........	St. Andrews......	Carman.........
Mrs. John McNeil......	Cloverdale.......	Carman.........

District No. 4, Inverness, Cape Breton, Victoria and Richmond Counties.

A. Scott McDonnell....	Port Hood.......	Carman.........
Horace B. Smith.......	Glendyer........	Rural Blush.....
J. Archie McDonnell...	Judique Inter....	Blues...........
James A. Beaton.......	Beatonville......	McIntyre........
Hugh McPherson......	Mabou..........	McIntyre........

General appearance considering:—(1) Method of planting, stand of crop.	(2) Vigor of growth, acreage, etc.	Freedom from blight, scabs and insects.	Method of thoroughness of cultivation.	Purity of variety.	Apparent yield considering:—(1) Number and weight of marketable potatoes per hill.	(2) Quality, color, shape and smoothness.	(3) State and uniformity of maturity, and freedom from sunburn.	Total.
7.	8.	18.	20.	9.5	13.	9.	9.	93.5
7.	7.5	19.	19.5	9.5	11.	10.	10.	93.5
7.	8.	18.5	20.	9.	11.75	9.	9.5	92.75
7.	7.5	17.	18.5	10.	13.	9.	10.	92.
7.	7.5	18.5	18.	9.75	12.5	9.	9.	91.25
7.	8.	16.	20.	10.	11.	9.25	10.	91.25
6.5	6.5	18.	18.5	10.	13.5	8.5	9.5	91.
5.	7.5	19.5	18.	9.	11.	9.	9.5	88.5
6.	7.	18.5	19.	9.	10.	9.	10.	88.5
6.	7.	18.5	18.	10.	10.	10.	9.	88.5
7.	7.5	19.	20.	9.5	10.	9.	8.	90.
5.	6.	18.5	17.	7.	12.5	9.	9.5	84.5
6.	6.	18.	17.	7.	9.5	8.5	9.	81.
6.5	8.	19.25	18.	10.	12.5	9.	9.5	92.75
6.5	8.	19.5	19.5	10.	11.5	9.	8.5	92.5
6.5	7.75	19.	19.	10.	12.	9.	9.	92.25
6.5	7.5	19.	19.	10.	12.	8.5	9.	91.5
6.5	7.5	18.	19.	9.5	11.	9.	9.	89.5

John McMullin	George's River	Blues
Alex. Rankin	Judique	McIntyre
John A. Campbell	Gnleoa Falls	McIntyre
J. E. Robitaille	West Artichat	Dakota Red
W. J. Sutherland	Little Mabou	McIntyre
Joseph Campbell	Big Pond Centre	McIntyre
Angus R. McDonald	B. Cove Chapel	McIntyre
Alex. T. Beaton	Brook Village	McIntyre
A. J. Campbell	Beatonville	McIntyre
D. R. Nicholson	Coxheath	Irish Cobbler
J. J. Johnston	Red Islands	McIntyres
Wm. Kempt	L'Archeveque	McIntyre
M. E. McNeil	Irish Cove	McIntyre
Alex. D. Beaton	Little Judique	McIntyre
John H. Smith	Hillsboro	Dakota Red
Allan D. McCuish	Lochside	McIntyre
F. A. McKillop	S. W. Mabou	McIntyre
J. J. McLellan	Glenville	McIntyre
John G. Beaton	Black Stone	McIntyre
Murdock A. McLeod	L. Lomond West	McIntyre

General appearance considering:— (1) Method of planting, stand of crop.	(2) Vigor of growth, acreage, etc.	Freedom from blight, scabs and insects.	Method of thoroughness of cultivation.	Purity of variety.	Apparent yield considering:— (1) Number and weight of marketable potatoes per hill.	(2) Quality, color, shape and smoothness.	(3) State and uniformity of maturity, and freedom from sunburn.	Total.
6.5	7.75	18.5	18.5	6.5	12.	9.5	9.5	88.75
6.25	7.5	17.	18.5	10.	11.	8.5	9.	87.75
6.	7.5	17.	19.	10.	10.	9.	9.	87.5
7.5	7.5	16.	18.5	10.	9.	9.	9.	86.5
6.25	8.	17.	19.5	5.5	11.	9.5	9.5	86.25
6.	7.5	18.5	16.	9.25	10.	9.	9.25	85.5
6.5	7.5	17.	19.	5.	12.	9.5	85.	5.8
6.	7.5	18.	17.	9.5	9.	9.	9.	85.
6.5	7.	17.	16.	10.	10.	9.	8.5	84.
6.5	7.5	17.	19.	7.5	8.	9.	9.5	83.
6.	7.	16.	6.5	8.5	12.	9.	8.5	83.5
5.75	6.75	18.5	18.	8.5	8.5	9.	8.5	83.5
5.75	8.	16.	19.5	10.	8.5	6.5	9.	83.25
6.	7.	17.	18.5	8.5	8.	9.	9.	83.
6.	7.	16.5	17.5	9.5	10.	8.5	7.75	82.75
6.	7.5	16.5	17.5	5.5	11.	9.	9.5	82.5
5.5	7.	17.5	16.	9.	10.	8.5	8.75	82.25
4.5	7.	18.	18.	8.	8.	9.	8.5	81.
5.	7.5	15.	16.	10.	9.	9.5	9.	81.
6.	7.25	15.	19.	8.	9.	7.5	9.	80.75
5.75	7.	15.5	19.	10.	8.	6.5	8.5	80.25

Dougald Campbell	S. W. Port Hood	Green Mountain
Angus McPherson	Rear Port Hood	Lincoln
H. G. Cameron	Inverness	McIntyre
John J. Beaton	W. Mabou Har.	McIntyre
James P. Tompkins	Emerald	Blues
J. G. McKay	Inverness	McIntyre
Angus A. McDonald	S. W. Mabou	McIntyre
Angus McPhee	Little Mabou	McIntyre
Constant AuCoin	Belle Cote	McIntyre
F. A. McRae	Baddeck Bridge	Thorburn
Eddy B. Smith	Black Stone	McIntyre
M. McKinnon	W. Bay Centre	Green Mountain
Andrew McLellan	Glenville	McIntyre
John D. McGregor	N. Lake Ainslie	Dakota Red
John L. Tompkins	N. E. Margaree	Blues
Duncan McKillop	Cleveland	Dakota Red
Reynolds Smith	Arichat	Dakota Red
Michael J. Coady	Emerald	Blues
Alex. Tompkins	Emerald	Blues

Generol appearance considering:— (1) Stand of crop.	(2) Type of plant, vigor and uniformity of growth.	(3) Acreage, method of seeding absence of lodging.	Freedom from weeds.	Freedom from smut, rust, blight and insects.	Freedom from other varieties and other kinds of grain.	Apparent yield and quality of grain considering:— (1) Proportion of well filled heads of plump grain of good quality	(2) Uniformity of mtutity	Total
6.5	7.	14.	18.5	10.	8.75	7.	8.5	80.25
6.	7.	16.	19.	8.5	9.	7.5	7.	80.
5.5	6.5	15.	16.5	10.	8.5	9.	8.5	79.5
5.	7.	14.	17.	10.	11.	7.	8.	79.
5.	7.	16.5	18.5	9.5	7.	8.	7.5	79.
5.5	6.	17.	18.	6.5	8.5	8.5	8.75	78.5
6.25	6.75	16.75	19.	5.5	9.	7.	8.	78.25
4.	8.	18.	18.	7.	8.	7.	8.	78.
5.	7.	17.	18.	7.5	9.	6.5	7.	77.
6.	7.5	16.	18.5	6.	8.	6.5	8.5	77.
5.75	7.5	16.	15.	9.	9.	7.	7.5	76.75
5.	7.	16.	15.	7.	8.	9.	8.5	75.5
5.	7.	16.	16.5	6.	7.	9.	8.5	75.
6.	6.5	14.5	14.	10.	7.	8.5	8.	74.5
5.	7.5	17.	15.	6.	8.5	7.	8.5	74.5
5.75	6.5	16.	16.5	6.5	7.5	7.9	8.5	74.5
5.	.....	15.	16.	7.	11.	8.5	8.5	70.5
5.	.....	12.	17.	10.	9.	7.	9.	69.

TURNIPS.

District No. 1, Digby, Yarmouth, Shelburffe, Queens, Halifax and Guysboro.

A. D. Burris...........	U Musquodoboit.	Jumbo..........
David Whidden........	Glenelg..........	Kangaroo........
F. J. Churchill..........	Chegoggin.......	Corning.........
John Ogilvie	Elderbank.......	Corning.........
E. McL. Benvie........	M Musquodoboit	
Ernest Redmond.......	Dean...........	Derby...........
J. Roy Sinclair.........	Goshen..........	Durham.........
E. D. T. Snow.........	M Musquodoboit	
Aubrey Archibald......	M Musquodoboit	Kangaroo........
John Corning..........	Chegoggin.......	Corning.........
Clifford Cann..........	Chegoggin.......	Corning.........
Ronald McIsaac.......	Giant's Lake	

District No. 2, Annapolis, Kings, Lunenburg and Hants Counties.

Mark Rhodenizer.......	W. Northfield....	Purple Top......
E. Karakuls Sheep Co...	Windsor	
Aseph Newcombe......	Newcombeville...	
Henry Newcombe......	Newcombeville...	
Annand F. Hebb.......	Hebbville........	

General Appearance considering: (1) Stand of crop.	(2) Method of Seeding, thinning	Cultivation	Freedom from disease and insect damage.	Quality of Crop, considering: (1) Purity and trueness to type.	(2) Neck and crown.	(3) Quality.	Yield per acre.	Total.
9.5	5.	14.5	14.5	4.5	4.5	9.5	20.5	82.5
9.5	4.75	14.5	14.	3.75	4.5	9.	21.75	81.75
9.5	4.	14.	13.5	4.75	4.	7.5	24.25	81.5
8.25	4.	14.5	14.5	4.75	5.	8.5	21.75	81.25
9.25	4.	14.5	14.75	3.	4.5	9.	21.75	80.75
9.	4.	14.25	14.25	4.5	4.5	9.5	20.5	80.5
8.5	4.75	14.	14.	4.5	4.75	9.5	20.5	80.5
9.5	4.75	14.75	14.	4.5	4.5	9.25	19.	80.
9.	4.5	14.	14.5	4.5	4.5	9.5	17.75	78.25
9.	4.5	14.25	14.	4.75	4.	9.5	18.	78.
9.	4.5	14.	13.	4.75	4.5	8.5	18.25	76.5
9.	4.5	14.	14.5	4.5	4.5	9.	14.5	74.5
9.5	4.75	14.	14.	5.	4.75	9.5	21.	82.5
8.5	4.25	14.	13.5	5.	4.75	9.	21.	80.
8.5	4.75	14.5	13.	5.	4.25	9.	19.5	78.5
8.5	4.	14.	13.5	4.5	4.	8.5	18.75	75.75
8.5	4.25	13.5	13.	4.	4.	8.5	18.25	74.

District No. 3, Colchester, Cumberland, Pictou and Antigonish Counties.

Edward Deon	Pomquet	Purple Top
John Semple	Truro	Corning
James Dunn	Lr. South River	Kangaroo
R. D. Ross	Bay View	
G. B. Clarke	Tatamagouche	Jumbo
Andrew Benoit	Pomquet	Jumbo
Ronald Chisholm	Glen Road	Purple Top
E. R. Byers	Old Barns	Purple Top
Alex. R. Landry	Pomquet	Purple Top
Harold B. Bowers	Great Village	Kangaroo
H. D. Campbell	Half Way Brook	
Dan Duggan	Beech Hill	Bronze Top
Harold Baxter	Addington Forks	
Blair Cutten	Truro	
J. W. Cameron	Lr. South River	Jumbo

District No. 4, Inverness, Victoria, Cape Breton and Richmond Counties.

R. M. Jackson	Jacksonville	Invictus
Jas. M. Murphy	N. E. Margaree	
John A. Campbell	Glenora Falls	Jumbo

General Appearance considering: (1) Stand of crop.	(2) Method of Seeding, thinning	Cultivation	Freedom from disease and insect damage.	Quality of Crop, considering: (1) Purity and trueness to type.	(2) Neck and crown.	(3) Quality	Yield per acre.	Total.
9.5	4.5	13.	14.	4.75	4.	8.5	27.	85.25
9.5	4.75	14.5	13.	4.75	4.5	9.	21.5	81.5
9.	4.5	12.	14.	4.5	4.5	8.	24.75	81.25
9.	4.5	14.	13.5	4.5	4.5	8.5	21.	79.5
8.5	4.25	13.5	14.5	4.75	4.5	9.5	20.	79.5
9.	4.5	12.5	14.	4.5	4.	8.5	21.	78.
9.	4.5	13.5	14.5	4.5	4.	9.	19.	78.
8.5	4.5	13.	14.	5.	3.5	9.	20.	77.5
9.25	4.5	12.5	14.5	4.5	4.75	9.	17.5	76.5
9.	4.5	12.5	13.5	5.	4.5	9.	18.	76.
9.	4.75	14.	13.	4.75	4.5	9.	16.	75.
9.5	4.5	13.	14.	4.	4.75	9.5	15.	74.25
9.5	4.25	13.	14.5	4.	4.	8.5	16.25	74.
8.	4.	12.	12.	4.5	4.	8.5	18.	71.
8.	4.	12.	14.	4.5	4.5	8.5	15.25	70.75
6.5	4.75	14.5	14.	4.	4.75	9.5	23.	81.
9.5	4.75	14.5	14.	4.5	3.5	8.5	18.5	77.75
9.75	4.	14.	11.	4.5	4.	9.	20.5	76.75

J. Archie McDonnell...	Judique Intervale	
John L. Tompkins......	N. E. Margaree..	
Vincent J. Coady......	N. E. Margaree..	
Peter McDaniel	Margaree Forks..	
Alex. T. Beaton.......	Brook Village...	
Napoleon AuCoin......	Belle Cote.......	
Frank McDaniel.......	N. E. Margaree..	Imported........
C. A. Munn...........	Leitches Creek...	Suttons Champ...
F. A. McKillop........	S. W. Mabou....	
Alex. G. McKay.......	Grand River.....	
John J. Johnston.......	Red Islands.....	Scotch..........

General Appearance considering: (1) Stand of crop.	(2) Method of Seeding, thinning	Cultivation	Freedom from disease and insect damage.	Quality of Crop, considering: (1) Purity and trueness to type.	(2) Neck and crown.	(3) Quality.	Yield per acre.	Total.
8.	4.5	14.75	14.	4.	4.	9.5	17.25	76.
8.5	4.5	14.	14.	4.5	3.5	9.	18.	76.
9.5	4.5	14.	14.	4.5	3.5	8.5	17.25	75.75
7.	4.	13.	14.	4.	3.5	9.	20.	74.5
7.5	4.25	13.	11.	3.5	3.5	8.	23.25	74.
8.5	4.	13.5	13.5	4.5	4.5	9.	14.5	72.
8.	4.	10.	12.	2.	3.	7.	21.25	67.25
8.5	4.5	10.	9.	3.	2.	5.	20.5	62.5
7.	3.75	14.	11.	4.5	4.	8.5	12.25	65.
6.	4.5	8.	9.	3.	4.5	8.	15.	58.
8.	2.	8.	10.	4.5	3.5	7.	14.25	57.25

REPORT OF WORK OF COUNTY REPRESENTATION IN CAPE BRETON.

Prof. M. Cumming,
Secretary for Agriculture,
Truro, N. S.

Sir:—I have the honor to submit herewith the fifth annual report of my work as Agricultural Representative in the Island of Cape Breton.

The season which has just been completed has been one of the busiest in the history of the work. The scarcity of food stuffs has led to greater effort among all classes to produce more from the land. This fact, together with a better understanding of the nature of our work, has caused the people to make more use of our department and has, in turn, prompted us to greater efforts. I am satisfied that this has been our most successful season.

The turnip demonstration was left in the hands of my assistants, Mr. Langille and Mr. Munn. A detailed report of this work follows the reports of these gentlemen.

I may say that the average yield per acre was 929 bushels, the highest yearly average during the five year period. The average yield per acre for the whole period was 833 bushels. These yields are considerably above the average for the Province and show what may be done along these lines.

This season a start was made in the co-operative marketing of wool. Working in conjunction with Mr. O'Brien, of the Dominion Live Stock branch, two Associations were formed, one in Inverness County, with a grading station at Poet Hood; the other in Richmond County, with a grading station at St. Peter's. At Port Hood 2457 lbs. of wool was graded and at St. Peter's 1437 lbs. The average price received for this wool was about 71c per pound. While the amount of wool gathered was comparatively small some was gathered from nearly every section in each county. This being the case we are confident that the bulk of the wool produced in these counties next year will be marketed through the Associations. Those who did market their wool in this way last year were well satisfied with the results. The Inverness County Association has perfected its organization and will make a special effort to persuade all the farmers to market their wool through them. In order to secure the wool from the Margaree Valley this organization will, this coming season, have a wool gathering station at, or near, Margaree Forks. The wool will be shipped from there to Port Hood for grading.

The children's garden competition, started at Ingonish last year, was continued again this season. There was a vast improvement in the care taken of the gardens as compared with last year. The competition was keen and the quality of the product was much more uniform. The Fair was held on September 18th. Here, again, there was a marked improvement, not only in the qaulity of the articles competing but in the selection of the exhibits. The result of this work has been very encouraging aside from the fact that there has been come real increased production in that section.

We did considerable work in spraying potatoes for blight. The barrel outfit, with the four row attachment, was used largely in the Mira district. This machine did excellent work and a large number of farmers took advantage of the opportunity to use it. In order to encourage the use of Bordeaux I procured a quantity of chemicals and insecticides which I sold to the farmers for cost. Last year Late Blight was very troublesome and did a good deal of damage. The farmers are seeing the advantage of spraying and next year will see a large demand for spraying machinery and materials. I consider spraying as being essential if one is to get a minimum crop and the importance of spraying cannot be impressed too firmly upon the grower.

During the first week in September a Short Course was held at Cape North. This course lasted for two days. The afternoon sessions were given over to lectures on the value of good seed and practical lessons on seed selection. The evening meetings were taken up with lectures on Live Stock, Soil Cultivation, Veterinary subjects, etc. The attendance at the afternoon sessions was small but the evening meetings were well attended. Great interest was shown throughout and I feel the time was well spent. I am very grateful to Dr. Gill, V. S., Mr. F. L. Fuller, Mr. J. P. Landry and Mr. S. J. Moore for their kind assistance. The success of the course is largely due to their efforts.

As in former years the greater part of the month of September, all of October and the early part of November was spent in the judging of field crops; judging at the local exhibitions, and in judging the Increased Production competition.

The crops on the Island were somewhat below the average this year. There was a large increase in the acreage devoted to wheat and potatoes. The total production of wheat on the Island will be very large this year. The potato crop suffered badly from blight.

Each year convinces me more strongly of the importance of the work of the Agricultural Representative, its great possibilities, and opportunity for real service. This is the link which brings the College to the farmer and is the only channel through which the various departments can reach every individual.

Each year brings forth more work to be done; new problems to be solved; and work along old lines to be extended. In order to do good work it is necessary that his territory be not too large, else he lose that individual touch which counts for so much. It is also necessary that he be on the job twelve months of the year if he is to do effectual work.

I wish to thank you, Sir, for appointing Mr. Munn as permanent Representative in Inverness County. Mr. Munn is opening an office in Inverness town. If he continues the good work he has done as my assistanr Inverness County will forge rapidly to the fore.

I am looking forward to the time when each county on the Island will have its permanent Representative. One of the great difficulties at present is to get men qualified for the work. These men must, above all things, be practical, self confident, energetic and resourceful. In addition to this they should have at least two years College training.

I feel that we could do better work of the Representative movement in the Province were better organized. At present we are working independently. We, in Cape Breton, have no knowledge of what our contemporaries on the mainland are doing. It would be to our mutual interest if we were in closer touch with one another. We could exchange ideas, give one another the benefit of past experience and by so doing make ourselves more efficient. While the work of the representative must always be more or less independent it could be greatly strengthened by strong co-operation.

In conclusion, I wish to thank yourself, as well as other members of the Faculty and Staff, for the interest taken in my work and for much valuable help and advice.

Respectfully submitted,

H. S. CUNNINGHAM.

Mr. H. S. Cunningham,
C. B. Counties Representative.

Sir:—I have the honor of submitting herewith my report as your assistant in connection with District Representative work in Cape Breton, also a detailed report of Demonstration plots in Inverness and Victoria Counties.

Starting work on April 23rd, my time was occupied until the middle of May, in promoting the Inverness Wool Grower's Association, I might mention that, although we did not get a very large amount of wool this year, this work proved very satisfactory, as a good working basis was established for the coming year.

The latter part of May was spent in getting in touch with the farmers on whose farms we were to have demonstration turnip plots.

Seeding was begun on May 30th and finished on June 21st. Thinning was commenced on June 22nd and finished on July 24th.

The latter part of July and the month of August was taken up with various work, such as potato spraying, seed selection, etc.

The month of September and until October was spent in judging Field Crops and assisting at local exhibitions.

From that time until the season closed I was occupied in demonstrating the work of the tractors which are being introduced into Nova Scotia.

Although the District Representative work in Cape Breton has sometimes looked rather discouraging, it seems now as though it were improving and we are looking forward to much greater work in the future.

The crops in Cape Breton this year have been fairly good, with one or two exceptions.

Potatoes were a light crop, mainly due to a very bad attack of blight. Our experiments in spraying for this fungus gace good results. It is my opinion that a vast amount of good could be done along this line in the future.

Oats did not fill well, a blight accounting for this in a good many cases.

Wheat was a fairly good crop as may be seen by the large amount which has been milled and is to be milled at the Baddeck Cereal Mill.

In conclusion I wish to thank yourself as well as all others member of the staff for much valuable advice and assistance.

Respectfully submitted,

T. C. MUNN.

Mr. H. S. Cunningham,
C. B. Counties Representative.

Sir:—I have the honor to submit herewith a report of my work as your assistant during the past season and also a detailed report of results obtained on Demonstration plots of roots, which were carried on in different sections of the Island of Cape Breton.

During the early part of May a portion of my time was spent in rendering assistance to the Richmond County Wool Grower's Association, as well as getting in touch with the farmers in general throughout the counties of Richmond and Cape Breton.

Seeding operations began the first of June. Owing to the continued wet weather which prevailed the seeding was not completed until July 2nd. Outside the regular Demonstration plots, a large number of instruction plots were seeded. All through the Island, both in county and town, a deeper interest than ever before was taken in the growing of vegetables and all foodstuffs.

The month of July was spent in turnip thinning. The greater part of this time being taken up with instruction work in many new sections. A portion of the month of August was spent in the northern part of the Island endeavoring to assist and encourage the greater production of roots and vegetables, of all kinds and particularly in getting the children interested in the value of the home garden. At Ingonish alone I had the pleasure of scoring up and judging some 58 of these children's gardens, where the results obtained and the interest displayed were exceedingly encouraging.

As in previous years the remaining portion of the month of August was spent in assisting the farmers in their many different problems, such as seed selection, spraying, etc., and in promoting a greater interest in agriculture in general.

The months of September and October were spent in the judging of field crops, as well as assisting at exhibitions and other agricultural fairs on the Island.

During the latter part of the season my time was taken up in the county of Richmond, and a portion of Cape Breton county, endeavoring to promote a deeper interest and further extend the organization of the Richmond County Wool Grower's Association.

During the early part of the summer, partially due to the continued rainfall, the growth was rapid. Every indication pointed to a large harvest. This continued rainfall was followed by a period of drought which checked the growth of the plants so severely that the results, although fair, are not what had been expected, however, in summing up the season's work, the results on the whole are very encouraging.

In conclusion I would desire to thank yourself, Mr. F. L. Fuller and all other members of the faculty and staff for much valuable advice and assistance.

Respectively submitted,

H. B. LANGILLE.

Name	Address	Plot	Kind of Soil	Previous Crop	Barn Manure	Nitrate Soda	Acid Phos.	Basic Slag	Date of Seeding	Date of Thinning	Actual Yield	Yield Per Acre
		ac.			C.L.	lbs.	lbs.	lbs.			bu.	bu.
Allan MacAdam.........	Eskasoni..........	.25	Loam...	Stub.	25	501	334	200	June 6th	July 10th	300	1200
Rev. A. R. MacDonald...	Xmas Isle.........	.50	C.Loam	Hay	15	50	334	200	" 12	" 7	310	620
*Rev. R. L. MacDonald..	St. Peter's.........	.50	H. Clay	"	15	50	334	200	" 18	" 20	462	924
R. A. MacAskill.........	Forchu............	.50	Loam	Stub.	12	50	334	200	July 2nd	" 31	500	1000
Rev. D. J. Rankin	Grand Mira........	.50	G Loam.	Hay	24	50	334	200	June 1	" 6	500	1000
Alex. Munroe...........	Marion Bridge.....	.68	C "	"	18	100	501	400	" 2	"	895	1305
Rod. Campbell..........	Hillside...........	1.00	Loam	"	22	100	501	400	" 2	" 2	1104	1104
MacEvoy Bros..........	Cape North........	1.00	L.S. "	"	40	100	500	400	" 14	" 18	1011	1011
Rev. P. Rankin.........	Creignish..........	.33	C Loam	Oats	20	50	250	200	" 15	" 15	201	603
H. L. MacDougall.......	Broad Cove Banks..	1.00	C Loam	Hay	40	100	500	400	" 13	" 12	114	1124
John D. Chisholm.......	Margaree Forks....	.50	S. "	"	27	50	250	200	" 2	June 29	616	1232
Geo. Munroe............	Belle Cote.........	.50	C. "	"	20	250	50	200	May 31	" 27	452	904
Gabriel Chaisson........	St. Joseph du Moine.......	.50	C. "	"	20	50	250	200	June 1	" 28	473	946
Rev. P. LeBlanc.........	Cheticamp.........	.33	H.C."	Oats...	15	50	250	200	" 21	July 24	227	681
John Hart..............	N. E. Margaree....	.50	G. "	Hay	20	50	250	200	May 30	June 22	450	900
½D. MacLellan..........	Up. Mid. River....	.75	S. "	"	35	100	500	400	June 20	July 19	320	448
Neil MacKinnon........	Kempt Head.......	1.00	C. "	"	40	100	500	400	" 7	" 3	.....	.....
D. A. MacDonald.......	Whycocomagh.....	.50	G. "	"	20	50	250	200	" 18	" 17	395	790

*Ground lime stone applied at the rate of 4 tons per acre.
½This plot was affected by a disease which was evidently a new one.
It was pronounced to be of bacterial origin but further than this we have no light on the matter.

M. Cumming,
Secretary for Agriculture, Truro.

Sir:—I herewith submit my eighth annual report. Twelve County Associations have qualified for the grant this year. This is a decrease of one. The Guysboro County Association which was organized last year, failed to report. This association was organized for the purpose of co-operative buying and selling, however, in common with other Farmers' Associations which undertook to do the same kind of work it was found defective, therefore, a co-operative association was organized under the 1908 Act and the County Association was allowed to elapse. Another year's experience confirms my opinion that County Associations will never become satisfactory co-operative Associations, however, where co-operative buying organizations exist the County Farmers' Association has proven itself a very important factor in promoting and carrying on the work of these co-operative associations. Furthermore for the purpose of conducting exhibitions, seed fairs, mutual farmers' insurance companies., etc. they have proved invaluable. It therefore appears to me that these associations have an important work to perform and I look forward to greater interest in the future.

Respectfully submitted,

F. L. FULLER.

COUNTY ASSOCIATIONS 1917.

COUNTY.	No. Members	No. Meetings	Total Attendance	Average Attendance	Total Receipts	Total Expenditure	Balance
Annapolis.							
President, F. H. Johnson, Bridgetown; Vice-President, A. Fitzrandolph, Bridgetown, Secy-Treasurer, L. W. Elliott Clarence	101	....	....	....	$127.30	$ 72.23	$55.07
Antigonish.							
President, Wm. Vinten, Silvan Valley; Vice-President, Ronald Chisholm, Antigonish; Secy-Treasurer, Duncan Chisholm, Antigonish	234	....	....	....	3122.21	3109.84	12.37
Cape Breton.							
President, J. W. Allen, North Sydney; Vice-President, J. W. McKenzie, Coxheath; Secy-Treasurer, R. M. Jackson, Jacksonville	154	6	182	31	532.49	169.05	353.44
Cumberland.							
President, Samuel Freeman, Amherst; Vice-President, Laurie McFarlane, Fox Harbor; Secy-Treasurer, C. H. Black, Amherst	142	18	535	30	121.78	66.45	55.33

COUNTY ASSOCIATIONS 1917—(*Continued*).

COUNTY.	No. Members	No. Meetings	Total Attendance	Average Attendance	Total Receipts	Total Expenditure	Balance
Digby.							
President, W. A. Bacon, Acadiaville; Vice-President, James Trevoy, Brighton; Secy-Treasurer, Frank W. Nichols, Digby	88	3	87	29	97.94	97.67	.27
Inverness.							
President, John Gillis, Harborville; Vice-President, J. Arch. McDonnell, Judique; Secy-Treasurer, A. J. Campbell, Beatonville	53	....	....	....	108.29	36.62	71.67
Kings.							
President, Geo. Pineo, Canard; Vice-President, A. N. Griffin New Minas; Secy-Treasurer, W. H. Woodworth, Berwick	140	11	1346	122	148.74	142.05	6.69

Lunenburg.							
President, Scott Hebb, Bridgewater; Vice-President, Mark Rhodenizer, Cookville; Secy-Treasurer; J. L. DeLong, Barss Corner	120	7	286	41	216.76	183.12	33.64
Pictou.							
President, R. A. Robertson, Salt Springs; Vice-President, E. A. Fraser, New Glasgow; Secy-Treasurer, C. A. Maxwell, Salt Springs	50	1	50	50	149.45	23.75	125.70
Richmond.							
President, Rev. J. E. Robitaille, West Arichat; Vice-President, Rev. R. L. McDonald, St. Peters; Secy-Treasurer, urer, A. E. Morrison, Point Tupper	104	10	320	32	81.00	75.55	5.45
Victoria.							
President, Colin Nicholson, Baddeck Bdge; Vice-President, Jas. McKinnon, Baddeck; Secy-Treasurer, H. G. Matheson, Hunter's Mountain	172	4	138	34	93.00	76.75	16.25
Yarmouth.							
President, Geo. M. Spurr, Chegoggin; Vice-President, Caleb Cook, Central Chebogue; Secy-Treasurer, S. P. Goudey, Yarmouth	182	12	1672	139	89.64	135.69	46.05

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